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AGRICULTURE

**REFERENCE BOOK
FOR
DOMINION-PROVINCIAL CONFERENCE
ON RECONSTRUCTION**

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AGRICULTURE



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REFERENCE BOOK
FOR
DOMINION-PROVINCIAL CONFERENCE
ON RECONSTRUCTION

CONTENTS

FOREWORD.....	5
PART I—GENERAL REVIEW—	
1. Division of Responsibilities.....	7
2. Research in the Natural Sciences.....	11
Provincial.....	11
Dominion.....	13
3. Economic Research.....	24
Provincial.....	24
Dominion.....	25
4. Experimental Farms.....	26
Provincial.....	26
Dominion.....	27
5. Activities Relating to Production.....	39
Provincial.....	39
Dominion.....	40
6. Marketing of Farm Products.....	43
Provincial.....	43
Dominion.....	44
7. Agricultural Extension.....	49
Provincial.....	49
Dominion.....	50
8. Dominion Wartime Agricultural Program.....	51
9. Other Marketing Activities.....	53
Wheat Marketing Activities.....	53
Support of Agricultural Prices.....	56
Provincial General Market Control.....	56
Provincial Market Control of Fluid Milk.....	59
10. Special Activities.....	61
Wheat Acreage Reduction Program.....	61
Prairie Farm Assistance Act.....	61
Prairie Farm Income Payments.....	62
Land Settlement and Land Use.....	63
PART II—CONSERVATION AND DEVELOPMENT—	
1. Foreword.....	75
2. The Prairie Farm Rehabilitation Act.....	75
3. Division of Responsibility and Procedure in P.F.R.A.....	76
Cultural Work.....	76
Land Utilization.....	78
Water Development.....	80
PART III—TABLES—	
Table No.	
Net Expenditures in Agriculture—	
1. Dominion and Provinces Combined.....	82
2. Per Dollar Cash Farm Income.....	83
3. Per Farm.....	83
4. Per Capita Farm Population.....	84
Net Expenditures in Agriculture—	
5. Dominion.....	84
6. Prince Edward Island.....	86
7. Nova Scotia.....	87
8. New Brunswick.....	88
9. Quebec.....	89
10. Ontario.....	90
11. Manitoba.....	91
12. Saskatchewan.....	92
13. Alberta.....	93
14. British Columbia.....	94
15. Net Value of Agricultural Production.....	95
16. Index Numbers of Farm Prices and Costs.....	95
Farm Cash Income by Provinces—	
17. Actual Amount.....	96
18. Per Farm and Per Capita.....	97
19. Total Improved Farm Acreage.....	98
20. Average Size of Farms.....	99
21. Average Improved Acreage Per Farm.....	99
22. Number Gainfully Employed in Agriculture.....	100
23. Improved Acreage Per Person Gainfully Employed in Agriculture.....	100

FOREWORD

This reference book is a descriptive, factual account of the various agricultural activities carried on by Dominion and provincial authorities. In particular, a review has been made of the way in which the concurrent powers of Dominion and provincial governments with respect to agriculture have been divided in practice and of methods by which co-operation has been achieved.

Parts I and III of this volume were prepared under the direction of Dr. J. F. Booth assisted by Frank Shefrin from material provided through the co-operation of various officers of the Dominion Department of Agriculture and the National Research Council. Part II was compiled under the direction of the Subcommittee on Agriculture and Combined Resources of which Dr. E. S. Archibald was Chairman and A. L. Stevenson, Secretary.

Sections 1 to 7 of Part I inclusive deal with what may be termed regular functions of departments of agriculture and corresponding services of other departments. Sections 8 to 10 of Part I describe special activities of departments of agriculture and services relating to agriculture under the administration of other departments.

The description of various provincial activities in agriculture has been based on available published material.

PART I

GENERAL REVIEW

I. DIVISION OF RESPONSIBILITIES

The British North America Act (Section 95) provided that

"In each province the Legislature may make laws in relation to agriculture in the province . . . ; and it is hereby declared that the parliament of Canada may from time to time make laws in relation to agriculture in all or any of the provinces . . . ; and any law of the legislature of a province relative to agriculture . . . shall have effect in and for the provinces as long as and as far only as it is not repugnant to any Act of the Parliament of Canada."

This section, therefore, provided for concurrent jurisdiction in the field of agriculture but gave the Dominion over-riding authority in case of conflict.

Other sections of the British North America Act also contain provisions affecting agriculture. The authority with respect to trade and commerce which was assigned to the Dominion (Section 91 (2)) is one of the most important; its significance has increased over the years as agriculture has become more specialized and as farm products have more and more entered into the nation's commerce. The power to deal with property and civil rights which was assigned to the provinces (Section 92 (13)) has also come to have an important bearing upon agriculture. Finally, the provisions of the Act dealing with weights and measures (Section 91 (17)), the management and sale of public lands (Section 92 (57)) and several other matters are of direct or indirect concern to agriculture.

It is not difficult to find the basis for this division of responsibility in regard to agriculture. Insofar as the provinces are concerned their interest is partly historical, and partly geographical and economic. The predecessors of our present provinces,—as independent colonies—were concerned with agricultural matters in their own right. In fact a very large part of the time and interest of colonial governments was devoted to agriculture. Most of the people were farmers and under the pioneer conditions existing required protection and assistance in various ways. The Colonial statutes of the late eighteenth and early nineteenth centuries contain many enactments relating to agriculture, including those providing assistance to agriculturist societies, forerunners of the present provincial departments of agriculture. It was natural therefore, that the representatives of these colonies who assembled to consider the terms of a union should provide that the legislatures of the provinces should have something of the authority over agriculture that the Colonies had possessed.

Historical precedent was not the only reason for the provision of dual authority in agriculture, however. There was a good deal of geography and economics back of the decision that some things in regard to agriculture should be done locally. The time and distance factor must have weighed heavily on those who had to consider these matters in 1867. How could any

national government with the methods of communication then prevailing, become familiar with agricultural matters in the very remote areas of Canada?

Time and distance are still important factors despite improvements in communication, and though there have been many changes, including the interests of the people in these same rural areas, there are still matters relating to agriculture that can be handled most effectively by provincial and local authorities.

It should perhaps be noted at this point that this natural and inherent interest of the provinces in agriculture was enhanced by two major developments early in this century. The first of these was the enactment of the Agricultural Aid Act, 1912 which was in turn superseded by the Agricultural Instruction Act, 1913, under which the Dominion agreed to make available the amount of \$1,000,000 annually for 10 years, to encourage agricultural instruction and demonstration in the provinces. The other event was the first World War. The necessity of encouraging production at that time and the use of the provincial Departments of Agriculture in "greater production" campaigns gave a new stimulus to provincial agricultural services.

As far as certain western provinces are concerned a third major development that encouraged an expansion of provincial responsibility and activity was represented by their assumption, in 1930, of complete control over natural resources.

Even at the time of Confederation it was apparent that there were aspects of agriculture that transcended local and provincial interests. Trade between the Colonies and other countries and between the Colonies themselves, had already reached considerable proportions. With Confederation these became matters for the consideration of the national government. Trade in turn rested upon production,—upon agriculture in the far reaches of the country.

With the formation of the Dominion and the expansion of trade between the provinces and with other countries, the need for a more extensive service—one that could take account of the broader national and international aspects of production and distribution—became apparent. The creation of the Dominion also emphasized consumer interest. There was need for the co-ordination of food production in a nation composed of several states or provinces. Famine and war already indicated the necessity for this. But peace or war the Fathers of Confederation were seized with the necessity of providing that the central Government, too, should have authority over agriculture. So important was it considered, even in 1867, that though concurrent authority was conferred upon the Legislatures of the Provinces, and on the Parliament of Canada, the authority of Parliament was put above that of Legislatures of the provinces in case of conflict.

Concurrent jurisdiction does not necessarily imply divided jurisdiction. True, it implies that each party has the right to legislate or to act in the given field, but it does not follow that that right is exercised in all

instances. It is possible through agreement or understanding to map out a field so that each party assumes responsibility for certain activities. Sometimes such a division results from a priority of interest. Even where there is no conscious effort to assign divisions of responsibility such divisions develop through inherent interests in different matters.

There are many matters in agriculture—using the term in its narrower sense as applying to activities associated with production in contrast to those relating to marketing—that are primarily or exclusively of provincial concern. For instance, the provinces legislate to protect farm property. Examples of this are the enactments dealing with prairie fires, with trespass, with animals running at large and with fencing and branding. Property and civil rights may be involved where these questions are under consideration. The provinces are also directly concerned with the control of weeds, with the use of fertilizers, with agricultural societies and seed fairs; and they have legislation and policies to promote such activities. The Dominion, though interested in such matters and prepared to assist in connection with some of them, has no legislation in these fields.

There is a second group of activities—and it has increased in size as agriculture has become more complex—in which both the Dominion and the provinces have an interest, though the degree of that interest varies. Even with respect to such matters divided jurisdiction is not necessarily a result of concurrent power to legislate. The field may be shared with the respective parties occupying different sections and with but a single authority over each. The Dominion has an over-all interest in the conservation of soil and water resources and may be interested in having farms properly drained, but action with respect to tile drainage may be considered a provincial matter. The Dominion is definitely interested in the control of insects and diseases affecting fruit and conducts research to that end, but the provision of an orchard spray service is considered a matter for provincial action.

So, too, with respect to some of the matters included in the category first mentioned. The control of weeds on farms is a matter on which the provinces alone have legislation, but the Dominion, under the authority of the Seeds Act, supplements this provincial control by regulations pertaining to the weed content of seed. And with respect to fertilizer the legislation of the Dominion with respect to quality standards may be considered as relating to the provincial measures regarding the use of fertilizers.

Finally, there is a third group—and this too has more occupants than formerly—in which concurrent powers have led to divided jurisdiction. Perhaps the references already made to control of plant and animal diseases may be extended to illustrate the case. Both governments are interested in this matter and each may conduct surveys and undertake research in an effort to discover and eradicate such disease. Each may also engage in research designed to develop resistant plants or animals. But there is usually an understanding between research agencies and workers which results in the co-ordination of all effort in the particular field. In this case, duplication of research may be considered desirable.

Again it might be noted that both the Dominion and the provinces have experimental farms and some of the activities of these institutions may be duplicated. In this instance, too, duplication and replication may

be desirable for it is by such practice that results are made applicable to varying conditions. By allocation of the field of activity and by assignment of projects unnecessary duplication and conflict of jurisdiction is avoided.

Actually the division of interest and of action is not always as sharply defined as the grouping and illustrations used in this outline may suggest. The one test that is generally applicable and most frequently used in considering legislation and policies is represented in the question "Is the matter of interprovincial or national concern?" If so, it may be considered a field for Dominion action. If not, it should be dealt with by the province. However, the fact that, by this test, a matter falls to one or the other does not mean that the party responsible will take action. It has happened that though a matter concerns two or more provinces and might be considered a proper field for Dominion action no action was taken. Such a situation may result in provincial action. The reverse situation may develop—has in fact. A matter obviously within provincial authority may be neglected for one reason or another but the national interest may require Dominion intervention.

Decisions with respect to matters involving jurisdiction are very carefully considered. In dealing with them agricultural officials have a considerable range of experience and of precedents to rely upon. They also have available the assistance of legal authorities. As a result there have been few instances of jurisdictional difficulty and there is no record of any decision declaring a provincial enactment in the field of agriculture repugnant to any Act of the Parliament of Canada.

With respect to marketing, however, the situation is different. Here legislation, both Dominion and provincial, has been declared *ultra vires* because the authority conferred represented an intrusion into fields beyond the control of the governments concerned.

Methods of Dealing with Divisions of Jurisdiction

It is only in the second and third of the categories of interest just outlined that any question of jurisdiction arises; and there is little to be considered in regard to the second. Where the field is divided and each government has an interest in some section, that interest is recognized. Co-ordination may be necessary to fit the interests together but it is not difficult to accomplish this. The research activities of the Dominion and the spray service of a province are separate services but they are easily co-ordinated to control orchard diseases.

Matters falling within the third group, i.e. where there is divided jurisdiction, may require more consideration. Here it may be a question involving agreement. Formal agreements involving signed contractual arrangements are not common, though not unknown. One such agreement between the Dominion and the province of Saskatchewan provides a basis for the acquisition of land by the province for the use of the Dominion in the development of an extensive community pasture program under the Prairie Farm Rehabilitation Act. A similar agreement applies to such activity in Manitoba. Another agreement between the Ontario Department of Lands and Forests and the Dominion Department of Agriculture involves the building of a laboratory at Sault Ste. Marie by the province and the equipping and staffing of the laboratory by the

Dominion. An advisory committee composed of officials of the two Departments will confer on the research to be undertaken but activities will be under the supervision of the Dominion Science Service.

Many less formal agreements are used. They may result from a meeting of Dominion and provincial officials at which resolutions are passed respecting a certain line of action. Such resolutions are then considered binding upon the Departments concerned. Many agreements are developed by special or standing committees representative of the Departments and institutions concerned, and they may be revised from time to time by such committees. Agreements may be developed by correspondence, and a memorandum of understanding may be drawn up for submission to the parties concerned. More frequently the arrangements are merely stated in the correspondence.

Such an agreement may provide, in the case of a research project that each government will contribute a stated number of technical and non-technical members of staff; that each will pay the salaries and expenses of its own staff; that cars for transportation may be provided by one party and their operating cost paid by the other; that office accommodation will be provided by one party and the cost of publishing any report that may result will be paid by the other. Finally, the agreement may state that any such report shall be published under joint authorship or with appropriate acknowledgement of contributions.

Frequently, programs of long standing may have been developed over a period of years by correspondence, meetings and discussion. They may have developed by stages—a process of evolution. There may be no record today of the original understanding but the program as it has evolved is continued.

Understanding and agreements may be made by administrators at different levels of responsibility. The more important are arranged through Ministers or Deputy Ministers of Departments. The less formal arrangements may be made by heads of Services or Divisions with the knowledge of the Deputy Minister.

Development of Services and Legislation

The decision to undertake a service, and if need be to legislate, may originate in any one of several ways. It may result from the discovery of a new disease or insect that threatens crops or live stock. It may result from widespread demands expressed in correspondence or in resolutions of important agricultural organizations. It may be suggested by provincial Departments or Colleges of Agriculture. Or it may originate in the department or government itself. If the new activity is proposed by a farm organization or by a provincial institution it is likely to be accompanied by a suggestion of provincial co-operation or joint action.

It is customary for the Dominion Department of Agriculture to confer with provincial Departments on new policies or changes in existing policies for the reason that any action taken is likely to affect the provinces. A similar procedure is ordinarily followed by the provinces where Dominion interests are involved but it will be appreciated that a province may find it necessary or convenient to act on a matter that is of little or no concern to other provinces or the Dominion. Consultation with others in such instances may be considered unnecessary.

Efforts to Eliminate Duplication and Overlapping of Services

In what has been written up to this point it has been shown that advantage has been taken both by the Dominion and by the provinces, of the authority to legislate in relation to agriculture. It has been suggested that in two rather broad categories of subjects where concurrent legislation might have led to misunderstanding and unnecessary duplication of effort, agreements were developed to prevent such occurrences.

More important than agreements, however, has been the development of goodwill and understanding; agreements alone could not have brought about the present favourable relationships.

The arrangements that now exist for co-ordination and integration of activities are known to those engaged in the various agricultural services but they are not so well known to others. It is understandable, therefore, that questions are asked concerning duplication of activities. After all there are ten departments of agriculture and nine Agricultural Colleges besides other institutions, all engaged in activities related to agriculture. What would be more natural than to conclude that there must be unnecessary duplication of effort and expense? The Royal Commission on Dominion-Provincial Relations, 1937, gave some consideration to this matter. In introducing its recommendations with respect to agriculture the Commission had this to say¹

“Dealing first with the extent of duplication, the Commission did not find, either in its public or private investigations, any basis for the popular belief that the activities of the Dominion and Provincial governments overlap extensively, or that by complete elimination of what overlapping exists there would be any substantial reduction in the present cost of agricultural services in Canada”.

A similar conclusion had been reached at the Conference of Ministers of Agriculture held at Ottawa in 1935. At that time the activities of the Dominion and of the provinces were reviewed by departmental officials. The conferees heard many expressions of commendation concerning existing relationships and arrived at the decision that there was little, if any, basis for criticism.

Such a conclusion would probably not have been reached had a Royal Commission or a Ministerial Conference examined relationships a decade or two earlier. The agreements and other means employed to achieve co-ordination have been referred to briefly. It may be useful at this point to describe how these came about and how the machinery of co-ordination now functions.

As already hinted the arrangements in effect in recent years have not always prevailed. Concurrent action had led to divided jurisdiction in some instances. There were complaints of intrusion and of duplication of services. Though investigation would probably have revealed that the difficulties were less serious than claimed, there was nevertheless a basis for complaint and matters might have become more difficult had efforts not been made to correct the situation.

The period when criticism was most prevalent was that beginning just prior to the last war and carrying through the decade 1920-30. The early part of that

¹ Report of the Royal Commission on Dominion-Provincial Relations: Book 2, Recommendations, p. 173.

period includes years of great agricultural expansion in Western Canada—years during which newly established provincial departments of agriculture were endeavouring to determine their responsibilities. They were followed by war years in which urgent appeals for greater production were made. There was thus on the one hand a disposition to examine policies and on the other pressure to provide new services to meet the need of the times. At that time there were complaints that activities of the Dominion extended into the field of provincial responsibility.

During the period under consideration many policies and activities were examined by administrative officials of both provincial and Dominion departments. Frequent discussions and conferences were held for the purpose of determining jurisdiction and allocating responsibility. Adjustments, compromise and co-operation were employed to effect a satisfactory integration of services. Continued progress was made in eliminating causes of friction and replacing duplication and overlapping.

The Canadian Society of Technical Agriculturists, organized in 1920, played an important role in this development. The Society included within its membership the majority of agricultural personnel within the Dominion and provincial services and a large number of college graduates engaged in farming or in business connected therewith. The local meetings and conventions of the Society provided an opportunity for discussion and for the development of understanding. The Society's standing Committees on Agricultural Policy and Education submitted annual reports and recommendations. These pointed out the areas of conflict and defined acceptable bases of responsibility.

The depression that began in 1929, and the curtailment of agricultural services that followed led to further action in government circles. The Dominion Minister of Agriculture in 1932 called a national conference of provincial ministers and of Dominion and provincial staffs engaged in agricultural work.

The activities of the Dominion and of the provinces were reviewed in considerable detail. The action already taken to eliminate duplication and overlapping was outlined and a decision was reached to create a national organization to extend the efforts already put forth. The result was the formation of a National Committee on Agricultural Services composed of the Dominion and Provincial Ministers of Agriculture and an Advisory Committee of technical agriculturists representative of all of the services, Dominion and provincial, engaged in scientific agriculture. The need for the formation of a National Committee was set forth in these words¹:

"The desirability of close co-operation between all governmental and institutional agencies serving agriculture is beyond question. It is recognized that an increasing amount of co-operation has developed during the past few years, particularly between men closely associated with one another around particular problems and projects. The first purpose of this conference is to set up a national committee which will be charged with the task of co-ordinating the work of those co-operative agencies already in existence and of recommending the organization of new co-operative bodies where necessary. While this

will not achieve at a single stroke that complete co-ordination of governmental services desired, it will provide the machinery for immediate co-ordination of many projects. Under existing conditions the best policy would seem to be to work from the ground up through the provincial joint committees and smaller group organizations of technical men themselves, endeavouring by means of a national committee to co-ordinate and extend their efforts as far as possible and at the same time to evolve broader principles of co-operative effort upon which it may be possible to build an ultimate co-ordination of the whole".

The formation of the National Committee was followed by the naming of sub-committees on specific matters and later by provincial committees. Referring to the work of the Sub-Committee the report of the Advisory Committee for 1944 states:

"The sub-committees review work done by different institutions and organizations in their respective fields and recommend allocation of projects to the different institutions and organizations. The National Advisory Committee and sub-committees are not policy making committees, but serve essentially the purpose of bringing about closer co-ordination of the various organizations maintaining agricultural services."

In addition to the Committees mentioned there are a very large number of other Committees functioning in the field of agriculture. Many of these operate within the Dominion Department to co-ordinate particular activities involving two or more divisions or services. Others include personnel of other Departments, of the National Research Council, the Bureau of Statistics, Wartime Prices and Trade Board and other agencies.

There are national committees composed of Dominion and provincial officials; also other committees which include university officials and representatives of farm and trade organizations. Many of these committees are concerned with research projects, some with specific policies and programs, while others were formed to act in a general advisory capacity.

In the provinces, too, there are a variety of committees, many of them including Dominion officials. Some function on a regional basis serving all of an area such as the Maritime Provinces or the Prairie Provinces.

Many of these committees have been in existence for a considerable period of time. They have enviable records of service in their respective fields and membership on many of them is considered a recognition—something appreciated. It is through such committees that agricultural services, Dominion and provincial, are co-ordinated.

In later sections of this brief where the activities of the departments and institutions are discussed, frequent references will be made to the work of such committees; also to the co-operation and joint effort that characterizes much of what is being done. If these are considered as part of a program involving machinery for co-ordination at the national level and carrying through to the regional, provincial and local levels—the whole program supported by agreements, understanding and a willingness to work together,—they give some indication of the efforts made to provide an integrated service in a field in which there is a division of legislature and administrative authority.

¹ National Advisory Committee on Agricultural Services; H. L. Trueman, *Scientific Agriculture*, September 1932.

THE NATURE AND ORGANIZATION OF AGRICULTURAL SERVICES

Provincial

In the sections that follow the activities of governments, Colleges of Agriculture, and other bodies serving Canadian agriculture will be discussed in some detail. Before launching into this description, however, it may be helpful to consider briefly the organization of services in the different departments and to explain the method used in this study to relate activities.

With respect to the organization of activities in the various provincial departments of agriculture there is a similarity but no absolute uniformity. Most of them recognize certain major fields of activity and these may be accorded division status. Where divisions are recognized activities relating to live stock, field crops, dairying and poultry raising are fairly common. An agricultural representative service and extension activities are found to exist in all provinces but the latter is not always under the Department of Agriculture. Activities of one kind or another with respect to land settlement are fairly general. All of the provinces assist agricultural societies in some manner. But entomology, horticulture, rural economics, agricultural engineering, marketing and other matters may or may not merit division status or even recognition, depending upon the agriculture of the province.

It should be noted, too, that activities in a particular field may in one province centre in the department of agriculture while in another they may be conducted from the College of Agriculture.

Dominion

In the Dominion Department of Agriculture activities are grouped on a functional basis in what are known as Services. Thus there is a service combining all activities relating to production—and another under which activities relating to marketing, including the grading and inspection of products, are centred. The Experimental Farms represent a service in themselves and all research activities in the natural sciences are grouped under a Science Service.

Since the Dominion Services are more extensive than those of the provinces and will be given more detailed consideration in this study it will be most convenient to discuss all services in terms of the Dominion basis of organization. Thus all activities relating to production will be discussed under that heading; those having to do with research will be grouped accordingly and so with the other activities. A field of activity, that relating to extension and publicity, which is relatively more important in the provincial field than the Dominion will be considered as a fifth group. Then there are a number of special activities relating to agriculture which in the main are administered by other departments, boards or commissions or which, though under a Department of Agriculture, are not a part of the regular organization. These will be treated as a group.

2. RESEARCH IN THE NATURAL SCIENCES

PROVINCIAL

Provincial governments have always been faced with the task of finding solutions to agricultural problems. Before Confederation, farmers' associations in the Maritime Provinces and Upper and Lower Canada sought information on the best methods of producing

crops and live stock. Farmers turned to the writings and the limited experimental work done by British agriculturists. It was soon found that experimental work had to be done under Canadian conditions to provide adequate answers to Canadian problems. Out of this need there developed provincial departments of agriculture, agricultural colleges, and experimental farms.

The provincial departments of agriculture have functioned in the main as administrative bodies, and the agricultural colleges have developed into teaching and research institutions. In the Maritime Provinces, Nova Scotia only, maintains an agricultural college. A two-year course is given and a considerable amount of experimental work is done on the college farm. In Quebec there are two agricultural colleges and a veterinary college which conduct their work in the French language, and a fourth institution attended largely by English speaking students. Degree courses and some post-graduate work are given at each of these Colleges. From Ontario west, each province has one agricultural college affiliated with the provincial university and providing degree courses and post graduate training. Ontario also maintains a veterinary college. These colleges conduct agricultural research. The province of Quebec has a number of agricultural schools and special farms and institutions on which a certain amount of investigational work is done. Ontario maintains one agricultural school giving a two-year course, and one provincial farm providing specialized short courses; both these institutions conduct investigational work. The Prairie Provinces at one time maintained provincial farms but this work was practically eliminated during the depression. Alberta has two agricultural schools giving a two-year course and conducting investigational work.

Research activities as conducted by provincial institutions vary widely in scope and quality. Much of the work done in the earlier years was simple testing of the effect of fertilizers, comparison of yields of different varieties of grains, the effect on animal growth of different feed mixtures and such simple investigations. The rapid increase in scientific knowledge following the first world war resulted in an intensification of work and refinement of method.

Most of the research work in the provinces is done at the agricultural colleges but some research relating to agriculture is done in other university faculties, especially in biology and chemistry. This work consists largely of problems being studied by candidates for the masters' and doctors' degrees. These problems range from purely laboratory investigations, arising out of work done in the department of the university concerned, to advanced work done on field problems brought to the university by post graduate students who may be employees of either Federal or provincial institutions.

Provincial departments of agriculture still continue to conduct from time to time, and in varying degree, investigations usually concerned with the effect of soil types, the effect of fertilizers, the control of weeds, and other projects which serve also for demonstration purposes. The provincial departments in a great many cases provide financial assistance to the agricultural colleges to conduct certain research projects.

In Ontario a considerable amount of research on agricultural matters is conducted by the Ontario Research Foundation.

The bulk of the research in the provinces done, or under the direction of the agricultural colleges, falls broadly into four groups: (1) soil problems; (2) crop production; (3) animal production; (4) processing and marketing of agricultural products.

Soil Problems

The basis of profitable farming is the maintenance of soil fertility. In a young country the store of fertility accumulated through centuries of soil weathering and plant and animal decay is tapped by the first few generations of farmers. When the virgin soil has been partially exhausted of the mineral constituents that are used by the growing plant, the farmers' troubles begin to multiply—the vigour of plants is lowered, crop yields decline, and weeds, diseases and insect pests increase.

Some of the provinces have been engaged in soils work for more than 20 years and in recent years all provinces have done something in this field. The program ranges from general reconnaissance surveys to detailed surveys and analysis of soils in special areas. This work is now co-ordinated with Dominion Government soil survey activities and general direction is being given by the National Soil Survey Committee, a joint federal-provincial committee. In addition to the survey work in each province, a considerable amount of research work is being done on the nature and structure of soils, particularly in the Prairie Provinces. In recent years special work has been done on the grey wooded soils of Western Canada and the clay soils of Northern Ontario.

All provinces have conducted field tests on the use of fertilizers for various crops on different soils, and intensive research is being conducted by some provincial institutions on the utilization of soil and fertilizer nutrients by plants. So-called "deficiency" diseases have been encountered in several farming areas, and research has demonstrated the use of "minor" and "trace" elements in preventing these diseases.

The value of ground limestone in correcting soil acidity has been studied for many years in Nova Scotia. Thousands of samples of soils have been analyzed and the lime requirements of various sections of the province have been determined.

Agricultural colleges, particularly in Saskatchewan, Alberta, Ontario and Quebec, have done work on farm drainage and irrigation and the efficiency of tillage instruments. The tillage equipment produced by farm implement manufacturers has been tested and improvements recommended. The effect of various cultural methods and crop rotations on the physical condition of the soil has also been studied.

A long time research project of the Ontario Research Foundation has been the study of physiography and climate in Ontario. The main geographical sections of the province have been studied in great detail. Fifteen climatic regions were set up. These regional climatic zones, when studied in conjunction with the soil survey, form an effective basis for all studies which aim to determine the regional adaptations of varieties and strains of farm crops.

Crop Production

The wide variations in soil, climate and accessibility to market require extensive investigations by provincial agricultural colleges, and provincial departments of agri-

culture have conducted during the last quarter of a century, thousands of field trials in an endeavour to determine the variety of crop which will give the best yield on a given type of soil over a period of years. These tests have varied from simple demonstrations conducted on local farms to the experimental plots maintained at government institutions where the results are checked by highly refined statistical methods through which the effect of soil, fertilizer, variety and climate are all taken into account.

Many agricultural colleges have done research in plant breeding in an endeavour to produce more suitable varieties. The Prairie Provinces have specialized on cereals, flax and forage crops, while eastern Canada and British Columbia have subjected all farm crops to variety tests and cross breeding to establish new varieties. Ontario has specialized in the production and culture of fruit crops at the Provincial Horticultural Station at Vineland, and Alberta is also developing this work at the agricultural college.

The agricultural colleges have done good work on spraying for the control of fruit and vegetable diseases. Work has also been done in the production of disease resistant varieties and strains of crops. Extensive research has been conducted at the University of Saskatchewan on the root development of weeds. Particular attention was paid to the effect of competition between weeds and crops where moisture was the limiting factor.

Animal Production

All the agricultural colleges conduct research on animal nutrition and the general care and housing of animals. Each institution has maintained herds of several breeds of domestic animals and in some institutions a considerable amount of work has been done in animal genetics. The production of new breeds of domestic animals is a slow and expensive process, and while this has been tried, particularly in connection with sheep in Western Canada, the results have been only moderately satisfactory.

At Macdonald College in Quebec, the Department of Animal Nutrition has carried on extensive studies in swine nutrition. Many determinations have been made on the chemical composition of Canadian feeds followed by experimental feeding to check the results in practice.

The breeding and production of poultry has been a major research project in all agricultural colleges. At the Ontario Agricultural College outstanding work has been done on poultry nutrition. This institution was one of the first to demonstrate the importance of vitamins in poultry feeding. In the Province of British Columbia the Poultry Department of the University has done intensive work on the care and nutrition of farm flocks. Particular attention has been paid to the utilization of various fish oils as sources of vitamins.

The two veterinary colleges in Canada have not done much research on animal diseases, but they have made some good contributions. The agricultural Colleges have done a considerable amount of research on nutrition as it relates to disease conditions in domestic animals.

Processing and Marketing

Dairy departments at the agricultural colleges have made excellent contributions to the production of butter, cheese and ice cream. Research on the production of

condensed and powdered milk has been undertaken largely by commercial organizations.

At the Manitoba Agricultural College experiments have been conducted on a piece of equipment used by the dairy industry in New Zealand. This equipment has proved successful for use in removing weed odours from milk which would otherwise be unsuitable for manufacture or for distribution as fluid milk.

Much work has been done on the packing and handling of fruits and vegetables, and on the care of and handling of eggs and market poultry.

Agricultural colleges at which household science is taught have done research in the cooking and preparation of foods and in the nutritional value of foods for human consumption.

DOMINION

DEPARTMENT OF AGRICULTURE

The Science Service was established in 1937 by combining under one administration the Entomological Branch and Divisions of other Branches devoted to scientific research. The Service now includes the Divisions of Animal Pathology, Bacteriology and Dairy Research, Botany and Plant Pathology, Chemistry, Entomology and Plant Protection.

The work of the Service is directed toward the solution of practical problems of agriculture, through the application of the results of scientific investigations. It deals with problems relating to the ravages of insect pests and diseases affecting plants and animals, the deterioration of plant and animal products through invasion of fungi and bacteria, the nutritional requirements of animals and plants, and the chemistry and microbiography of soils and dairy products. In succeeding pages the work of the various Divisions will be outlined in some detail and references will be made to co-operative relationships with other organizations. At this point it seems appropriate to refer to the means by which these relationships are carried on.

The Science Service has forty laboratories in the Provinces, and a series of headquarters laboratories at Ottawa and Hull. The Experimental Farms Service has 28 branch Farms and Stations, 6 Substations, 8 laboratories, 157 illustration stations and 51 district experiment sub-stations in the provinces and 10 scientific Divisions at Ottawa. The number of definite scientific projects dealt with by these staffs runs into many hundreds, and it will at once be evident that co-ordination of the work is absolutely essential.

Important problems in scientific agriculture usually require the attention of more than one science and wherever it is considered desirable Departmental research problems are assigned to teams of workers. In order to accomplish this division of work effectively, the Department has appointed a large number of Departmental research committees, with membership drawn from the Divisions which are concerned with the field of work covered by the committee. Projects are reviewed in committee, work is assigned and reports received and published either by the committee or by the individual workers. In addition to the scientific divisions the production and marketing groups are often represented, and bring to the committee their wide knowledge of agricultural conditions and needs. These committees are the chief mechanism for co-ordinating the Department's scientific work; but it is the established policy to develop

teamwork and co-operative effort among individual workers, among the Divisions of the Department, and between the Department's staffs and the universities, other scientific bodies and industry. The National Advisory Committee on Agricultural Services, with a series of sub-committees and membership drawn from Dominion and provincial Departments, the National Research Council, agricultural colleges, and industry, is concerned with over-all planning and co-ordination of agricultural work.

In addition to Departmental committees, there are many others which co-ordinate the work of the Department with that of the Provincial Departments of Agriculture and Lands and Forests, the agricultural colleges, and the National Research Council. With the National Research Council the Department has a series of joint associate committees which co-ordinate very effectively the work of these two bodies with that of other scientific laboratories, including the Ontario Research Foundation, and in some cases with industries. During the war these associate committees have met less frequently; but they will soon function fully again, to the very great advantage of scientific agriculture.

There are also a large number of National, Dominion-Provincial and Provincial committees which co-ordinate agricultural activities and are, in many cases, associated more or less directly with research.

Animal Pathology

An embryo Division of Animal Pathology was established in 1874. It was devoted to the prevention of animal disease in Canada. For ten years, as time and conditions allowed, contributions were made to the knowledge of trichinosis, hog cholera and tuberculosis. About 1898, a Station was established at Outremont, Que., for the study of animal diseases. In 1900 an assistant was appointed in the person of a young veterinarian. In 1902, the Dominion service was reorganized into the Health of Animals Branch, made up of two sections, the Contagious Diseases Division and the Pathological Division.

In 1903, a small laboratory was constructed at the Experimental Farm. Here was carried on many interesting studies, among them methods of preparing various biological products, such as tuberculin and mallein, to be used for diagnostic purposes. In 1917, a property was purchased on the outskirts of Hull, for the accommodation of large animals. Much of the investigational work was transferred to this Station. By 1920, the activities of the Division had outgrown the quarters on the Experimental Farm and consequently a large old house was taken over in Ottawa and converted into a temporary laboratory building. In these laboratories in Ottawa and Hull were carried on studies and services until 1928, at which time a large Institute was constructed on the Mountain Road, Hull, Que.

The activities of the Division may be divided into three sections: research, service and the manufacture of biological products. Although the staff of the Division has been reduced, due to members having joined the armed forces, and for other reasons, there has continued to be a steady growth in each of the three sections mentioned. Research studies have been extended, co-ordinated and organized. An attempt has been made to determine the most important conditions standing in the way of maximum production, and a program of studies has been built around these. In the following

paragraphs these studies, and the problems that gave rise to them, are discussed briefly.

Virus Diseases.—Encephalomyelitis of horses has proved to be controllable by a specific vaccine and therefore the application of this vaccine eliminates the greater part of the economic loss caused by the disease. In addition to horses, however, man may become infected by the causative virus which produces in him a serious and often fatal illness. In regions where encephalomyelitis appears it becomes important to know whether a vaccine similar to that prepared for horses will also protect man. A co-operative study with the Department of Health of Manitoba has resulted in determining that there is a somewhat different response to the vaccine in the bodies of persons.

Infectious anaemia in horses has given rise in the past to great economic loss. The disease was at one time confined to Western Canada but in later years has made its way into the East and has become one of importance, particularly in the lumbering districts of Northern Ontario and Northern Quebec. There are many features of interest concerning this disease and from time to time attempts have been made to immunize against it. Using newer methods of study, attempts have been made to propagate the virus under artificial conditions but it appears to be one of those which does not lend itself to this purpose. Newer methods of preparing specific vaccines have been employed and these vaccines are at present under critical study to determine their potency.

The importance of swine fever or hog cholera is not so great in Canada as in many other countries of the world. This is due to the measures which have been adopted in the past for dealing with outbreaks. By destroying affected animals, reservoirs of virus have been removed. In other countries where this policy is not pursued, a system of vaccination has been carried on and in recent years an inactivated virus has been used as vaccine. This system of vaccination is carried out in the United States and the importation of a considerable amount of American pork raised the question of whether vaccinated animals might become carriers and introduce virus into this country through the medium of pork. From the study it was found that no vaccine available to Canada was capable of conferring an appreciable degree of immunity on Canadian pigs. The discovery, however, has led to a large co-operative experiment undertaken by this Division and the United States Bureau of Animal Industry.

For many years a few sections of Canada have from time to time been affected with swine fever virus and some difficulty has been experienced in controlling it in these regions, although in other parts of Canada the infection is easily controlled when appropriate methods are used. The suspicion was aroused that in these areas some form of life other than the pig carries the virus over long periods of time. A survey of these districts was undertaken and the determination made that the thorny headed worm, a parasite which affects the intestines of pigs and passes part of its life cycle in the June Bug, was present only in these regions. An experiment has been set up with the view of determining whether swine fever virus can be carried through the life cycle of this parasite.

Other research on virus diseases includes work on transmissible Leucosis and infectious Laryngotracheitis of fowl and calf pneumonia and shipping fever.

Bacterial Diseases.—Infectious abortion or Bang's disease of cattle continues to be one of the important problems. Energetic steps have been taken to solve some of the factors related thereto but since the infection is insidious, experimental progress is slow.

Sufficient has been done to indicate that curative treatment has no value and that the disease must be controlled by preventive measures. Over a number of years, data have been collected which indicate that by using these measures herds may be free of infection, often at a small cost.

A good deal of experimental work in vaccination of calves and adult animals has been done. Critical studies have been made of serological tests used for discovering infected animals.

The bacterial diseases on which experimental work is being conducted include mastitis, swine erysipelas, necrotic enteritis, pullorum and actinomycosis of cattle.

Parasitic Diseases.—A continuation of the study of nodular disease of sheep has resulted in an extensive study of the effects of phenothiazine, a drug specific against the causative parasite. These studies have not been confined to the one species of animal but have extended to other species. Field trials have continued to emphasize the usefulness of this drug in the control of nodular worms.

In Western Canada there is a condition colloquially known as 'black scours' and which was formerly thought to be due to a parasitic cause. During the past year an extensive investigation was carried out, which demonstrated that the condition is not due to a parasitic invasion. The exact nature of the cause has not yet been determined.

Coccidiosis of poultry is frequently the cause of great economic loss to the poultry industry. It appears to be in large measure controllable by certain forms of management which permit young chicks to gain resistance before they have been overwhelmed with the parasite. In addition to this, however, outbreaks occur in adult fowls which cause great loss, and the use of certain drugs of the "sulpha" group has received attention in other countries. Two of the newer forms of these drugs have been investigated with the result that they appear to possess considerable value in controlling the acute form of infection.

Red squill is an infective raticide and is reported by some as being non-poisonous for pigs. Experiments have shown that it is equally as poisonous for swine as for rats but that it is distasteful to the former animals and, under ordinary conditions, they will not eat baits containing the amount of drug usually employed for killing rats.

Services.—The laboratory services of the Division have many ramifications. Assistance is given to veterinary surgeons, physicians, owners of livestock and others through laboratory examinations which include serological tests, post mortem examinations, bacteriological and pathological studies and other forms of laboratory technique. In addition, co-operation has been carried on with other Government Departments such as the exam-

ination of raticides and commercial preparations for the control of parasitic infestations.

Biological Products.—In addition to the foregoing research and service activities the Division is engaged in the manufacture of biological products. Substantial quantities of tuberculin, mallein, johnin and Brucella abortis antigen are produced.

Division of Bacteriology and Dairy Research

Recognition of the need for research on problems of agricultural production and processing which bear on the science of bacteriology led to the creation, in April 1923, of the Division of Bacteriology as an integral part of the Dominion Experimental Farms Branch. Investigational work was directed towards problems of dairying (milk production), soil fertility, fruit and vegetable processing, apiculture, fibre production and other problems arising out of the activities of the Experimental Farms and other Branches of the Department of Agriculture. The Division was called upon to perform other services which became necessary as the activities of the Department of Agriculture as a whole developed. These involved analytical work chiefly in connection with the administration of Acts and Regulations as more and more agricultural products were brought under official control for quality.

In December, 1923, the Division of Dairy Research was created as a part of the former Dairy and Cold Storage Branch. Located in downtown Ottawa, this Division directed its attention towards problems of manufactured dairy products—butter, cheese, ice cream, dried milks—chiefly from the standpoint of the maintenance of quality control and the remedying of defects. Though the work on milk production problems of the Division of Bacteriology complemented that of the Division of Dairy Research on dairy products, the work was difficult to co-ordinate to best advantage, while the latter Division worked under the disadvantage of being without manufacturing facilities.

Following reorganization of the Department in 1937, both Divisions were brought within the newly created Science Service, and amalgamated as a single Division known as the Division of Bacteriology and Dairy Research. In 1939 the staff of the former Division of Dairy Research moved to the Central Experimental Farm. The fusion of the two Divisions has resulted in increasing the effectiveness of the work undertaken. Not only has research in dairying been strengthened, but the other activities in the field of agricultural bacteriology have been furthered and made more effective by the amalgamation. At the same time the co-operation maintained by the former Division of Bacteriology with the Experimental Farms has been strengthened in the investigational work now carried out by the Division of Bacteriology and Dairy Research.

The activities of the Division may be considered as falling into three classes: (1) Research on all phases of agricultural production and the processing of products where the science of biology may make a contribution; (2) Direct service—through analytical work in co-operation mainly with other Divisions and Services, through preparation of legume inoculants and cheese starters; (3) Official Control Work—consisting of bacteriological examination of products to note conformity with specifications for quality as set forth in various Dominion Acts and regulations.

Dairy Research.—The value of the resazurin test for grading milk has been increased by a modification known as the "triple reading test", which under commercial conditions has been found to give satisfactory results. A survey showed that corrosive sublimate tablets for preserving composite milk samples in cheese factories varied widely in strength. This has led to measures for better standardization of tablets for use in the dairy industry.

Studies of commercial butters, supplemented by experimental churnings, provided information on the relationship of bacteriological quality, copper content and acidity of butter serum to flavour and keeping quality. Further work was done in studying the bacterial discoloration of print butter of which outbreaks occurred in British Columbia, Manitoba and Ontario. During the year the Division assumed responsibility for the control testing of butter packed in Canadian Army Mess Tin Ration Units, and information was obtained on keeping quality.

Work was continued on a study of rancid flavour in Cheddar cheese. It was found that agitation of warm cheese milk induces this effect, the development of rancidity being lessened by lowering the temperature of agitation. This provides a further reason for adequate cooling of cheese milk. The mechanism of the production of this defect was also studied and was found to be associated with the degree of fat dispersion. A new method was developed for determining sediment in cheese, as a check of cleanliness of production and manufacturing methods. Studies on milk clarification of cheese milk were continued.

Food Microbiology.—Research on dehydrated vegetables included control work on commercially packed products and assistance was given to packing plants in aiding them to turn out products within the standards aimed at. A simple plant test was developed for assessing the microbial content of dried vegetables. Information was obtained on the effect of the blanch treatment in eliminating food poisoning staphylococci, while studies were made of the relative efficiency of air filters for use in dehydration tunnels.

All egg powder exported to Britain was subjected to official bacteriological control. A direct microscopic method for counting bacteria in egg powder was worked out and a limited count by this method incorporated in the specifications for Grade A powder. Much assistance was extended to Canadian egg drying plants by means of sanitary surveys and the investigating of causes of difficulties due to high count powder. Simple methods for detecting the extent of bacterial contamination for use in drying plants were devised which have been effective in locating sources of serious contamination. Special investigations have also been made of the effect of storage on bacteria in egg powder and the bacterial content of shell eggs.

Surveys were made of curing pickle for all plants exporting Wiltshire bacon. The bacteriological control of edible gelatin was continued, as well as the control of quality of canned tomato products. Field tests showed the cause of high counts found in tomato juice from one area.

Soil Microbiology.—Further fundamental studies were made in the nutritional requirements of soil bacteria, with special reference to the effect of incorporating plant tissue in the soil. The results are of value in

further extension of the leads already obtained in studying the relationship of soil micro-organisms to soil-borne plant diseases.

Miscellaneous Investigations and Services.—Considerable progress was made in the study of citrinin, an anti-bacterial plant produced by mould growth, with regard to its production, isolation and action in inhibiting various species of bacteria. Studies are also under way on the anti-bacterial properties of other moulds.

Research on the fermentation of wheat mash for the production of butylene glycol by bacterial action showed the effect of environmental factors on the activity of the organisms. Selections were made of high yielding strains of bacteria. Information was obtained on the effect of bacteriophage on suppressing bacterial action, and resistant and susceptible strains of bacteria were selected and tested for efficiency.

Studies were made of the organism responsible for American foulbrood of bees in respect to viability and other characters.

Microbiological methods for assay of vitamins has been a recent subject of study. Most attention has been devoted to the assay of riboflavin and a satisfactory technique has been worked out. Procedures for other vitamins are being given attention, which work is related closely to our fundamental studies of the growth requirements of bacteria.

The analytical work of the Division the past year involved the examination of samples requiring bacteriological testing. In addition legume inoculants were prepared for Experimental Farm and Illustration Stations, and cheese starters were distributed to factories.

Services performed and activities conducted with other Departments and Colleges of Agriculture include (a) a study of the quality of Canadian cheddar cheese—with the Ontario Department of Agriculture and the Ontario Agricultural College; (2) A study of antibiotics produced by fungi and other organisms—with Macdonald Agricultural College; (3) Assistance to Ontario creamery and cheese instructors; (4) Instructional courses at Kemptville Agricultural School and the Ontario Agricultural College; (5) Assistance to various provincial associations including "Association des Techniciens en Industrie Laitière" of the Province of Quebec.

Botany and Plant Pathology

Botany combined with entomology was given formal recognition by the Dominion Government in 1884 and became an activity of the Dominion Experimental Farms in 1887. In succeeding years the activities at Ottawa were supplemented by the establishment of branch laboratories in all of the provinces—the first of these being at St. Catharines, Ontario, in 1912. In due course entomology was recognized as a separate field and organized as a Branch of the Department independent of the Experimental Farms. In 1937, Botany combined with Plant Pathology, became a Division of the newly created Science Service. In the development of the work of the Botany Division several events stand out. One was the discovery of the dreaded potato canker in Newfoundland in 1909, the enactment of the Destructive Insect and Pest Act by the Dominion and the voting of money for control purposes in 1910. The second was the creation of a Potato Certification Service, an outcome of the discovery of powdery potato scab in Canada

in 1912 and the imposition of an embargo by the United States against the importation of Canadian potatoes. The third event was the establishment of the Rust Research Laboratory in Winnipeg following the disastrous epidemic of stem rust in 1916.

The Division of Botany and Plant Pathology is primarily a research institution. It combines with this a public service in advice on the control of plant diseases and in the dissemination of botanical information pertaining to plant identification, the utilization of certain native and introduced plants and other allied topics.

The section dealing with plant pathology carries on extensive investigations into the cause and control of the important diseases affecting agricultural crops and forest trees. The control of diseases through breeding for resistance is a joint undertaking with the Experimental Farms Service. The examination of cereal and vegetable seed samples for the presence of seed-borne pathogenic organisms supplements the seed inspection work of the Plant Products Division of the Production Service. Several activities of direct aid to the growers, such as seed potato certification and spray services, have been organized and developed, and, while some of them have been taken over in recent years by other Dominion agencies or by the provinces, the Division retains its connection with these in an advisory capacity. The plant pathological work is carried out at a Central Laboratory in Ottawa and twelve branch laboratories of which at least one is located in each province. The principal activities carried on by each of these laboratories is given below.

The strictly botanical phases of the work of this Division are carried out almost exclusively at the Ottawa laboratory. This section maintains the Dominion Arboretum and Botanic Garden, which serves as a centre for plant introduction especially through a world-wide seed exchange; it also conducts research work and surveys related to the native and introduced flora of Canada and is maintaining a large herbarium for the advancement of this work. Studies on weeds are also conducted, including a survey of their distribution, advisory work on weed problems and studies on weed seed germination. Special attention has been given during the past five years to the utilization of native and introduced plants especially for rubber and for medicinal purposes. This has entailed considerable field experimentation and plant physiological and cytogenetical research. In connection with war projects on milkweed as a source of rubber and as a substitute for kapok, this section has organized extensive collection campaigns for the Agricultural Supplies Board with the close co-operation of the provinces of Manitoba, Ontario and Quebec, and the United States Department of Agriculture. In addition, this section serves as a source of information to the public on all phases of botany, co-operating with the provinces on weed surveys, especially in Manitoba, on weed life history and control of dodder, more particularly in Ontario, and on surveys of native flora with Nova Scotia, Saskatchewan and Alberta.

Ottawa, Central Laboratory.—The general administration of the Division is carried out at the Central Laboratory, and its specialized library of over 7,000 volumes serves all of the units. In addition, it is the centre for certain phases of plant pathological work which are Dominion-wide in scope.

One group of officers is responsible for the preparation of an annual report on the prevalence of plant diseases in the Dominion, using the records submitted by plant pathologists and others. This group also maintains a micological herbarium and makes a large number of identifications of fungi submitted by members of the various units of the Division as well as by workers outside of the Division. It also makes recommendations on all importations of nursery stock that have been intercepted because of the presence of disease, and advises on the registration of fungicides before they may be offered for sale.

Another group deals with forest pathological problems. The problems being studied include the factors affecting the buoyancy of pulpwood bolts, the deterioration of fire and insect killed timber, and other topics related to the diseases of forest trees. Several of these projects are carried out in co-operation with pulp and paper companies and with the Dominion and Provincial Forest Services. A summer Laboratory is maintained at the Petawawa Forestry Service Station.

Another group is devoted to the study of the diseases of fruit and vegetables and especially potatoes. The bacterial ring rot of potatoes is receiving special attention in the experimental and research activities of this group and much advisory work is done, especially in connection with the Seed Potato Certification Service of the Plant Protection Division, and the Inspection Service of the Fruit and Vegetable Division.

A fourth group concerns itself with the problem of the diseases of crop plants initiated by seed-borne pathogens. The pathological examination of various seed stocks to determine their suitability for seeding and the inspection of field crops grown for the production of foundation and elite seed are making a contribution to the good reputation of Canadian grown seed stocks. This work is closely associated with the Plant Products Division and the Canadian Seed Growers' Association.

Prince Edward Island.—The Charlottetown Laboratory, located on the grounds of the Experimental Farm, is especially concerned with the diseases affecting turnips. The late blight and bacterial ring rot diseases of potatoes are the ones receiving special attention as they present a serious menace to a crop which is of such great importance to this province. In addition to the large quantities of table stock grown on the Island, it produces nearly half of the Dominion's supply of certified seed. In this work there is the closest co-operation between the Laboratory, the Plant Protection Division, and the Provincial authorities.

Nova Scotia.—The Kentville Laboratory situated as it is near the Annapolis Valley, provides a special service on disease control for the apple growers. By means of experimental plots and demonstrations the standard and new fungicides for the control of apple diseases are tested and the results made available to the growers. In addition, advice is given on the diseases of root crops and vegetables, especially potatoes.

The activities of this Laboratory have been of limited scope during the war years for four of the technical employees enlisted in the armed forces, and it has been possible to replace only one of these.

New Brunswick.—The Laboratory for this Province is located on the grounds of the Fredericton Experimental Station. The major part of its work deals with the diseases of potatoes. An intensive study of the virus

diseases affecting potatoes has been conducted. Close collaboration with the Station staff is maintained especially in their potato breeding project. The Laboratory staff is responsible for testing the many thousands of seedlings for resistance to fungus and virus diseases. In addition, some work is done on the diseases of the orchard, cereal and vegetable crops.

Quebec.—The Laboratory is at Ste. Anne de la Pocatiere, on the grounds of the Experimental Station. It is giving attention to the diseases of a number of crops, more particularly to potatoes, peas and flax. The potato work includes studies on late blight and bacterial ring rot and investigations are being made into the vitamin requirement of certain organisms pathogenic to potatoes. Considerable attention is given to the diseases affecting fibre flax, especially in the intensive areas devoted to this crop in the eastern part of the province. The Laboratory co-operates with the provincial authorities, the Colleges and the Seed Potato Certification Service of the Plant Protection Division.

Ontario.—There are two Laboratories of Plant Pathology in Ontario, exclusive of the Central Laboratory at Ottawa. One is at St. Catharines and the other at Harrow.

The St. Catharines Laboratory with its own experimental orchard is equipped to aid growers in the Niagara Peninsula in the control of diseases of large and small fruits. The experimental orchards provide information which is made available to the growers through the Spray Service and other extension channels. An intensive study is being made at present of the virus diseases affecting stone fruits, in co-operation with the Summerland, B.C. Laboratory, and fruit pathologists in New York and Michigan. Other activities include work on the virus diseases of tobacco and raspberries, vegetable diseases, inspection of raspberry nurseries and vegetable seed stocks, and examination of potato tubers submitted by the provincial authorities conducting the bacterial ring rot survey.

The Laboratory at Harrow serves the agricultural industry of southwestern Ontario. Its greatest contribution has been in the diseases of sugar beets, soybeans, greenhouse crops and in its co-operation with the Harrow Experimental Station in the production of hybrid seed corn and tobacco varieties possessing greater resistance to the more important diseases affecting these crops.

Manitoba.—The Winnipeg Laboratory—popularly known as the Rust Research Laboratory—is the centre for investigations on rusts, smut, and bacterial diseases of cereals and flax rust. It is responsible for certain investigations on root rots of cereals and for the seed-borne disease examination of foundation, elite and registered cereal seed samples originating in Manitoba, Ontario, Quebec and the Maritime Provinces. Attention is given to some of the other diseases of cereals and flax, and to vegetable diseases that are, locally, of economic importance. Laboratory and greenhouse accommodation is provided in this Laboratory for the Dominion Cereal Breeding Laboratory (Cereal Division, Experimental Farms Service), and extensive co-operative work in the production of disease-resistant varieties of wheat and oats is carried on by the staffs of the two Laboratories. Similar co-operation, although necessarily less extensive, is afforded the Cereal Division, Ottawa, and the Dominion Experimental Farms and provincial Universities in Western Canada in respect of the testing

for disease resistance in new productions of cereals and flax.

Saskatchewan.—The Laboratory for this province is in quarters rented from the University of Saskatchewan in Saskatoon. It is devoting most of its attention to root rots of cereals and to diseases and defects of the seed of these crops; these being the troubles of greatest importance in this province. More recently its activities have been extended to a study of the more important vegetable diseases. It also co-operates with the Field Husbandry Department of the University in the testing of new varieties and strains of field crops for disease resistance.

Alberta.—The Laboratory at Edmonton occupies laboratory and greenhouse space rented from the University of Alberta. The cereal root rot problem receives attention here also, more particularly in relation to cultural practices. It is also the centre of the Division's work on the diseases of forage crops including the bacterial wilt of alfalfa and a number of crown and root rots of legumes.

Every possible assistance is given to the provincial Department of Agriculture in their field surveys for bacterial ring rot of potatoes which is most prevalent in the Lethbridge area.

British Columbia.—In the Okanagan Valley the most serious trouble affecting the apple industry was proved to be due to a boron deficiency of the soil. Through the co-operation of the Summerland Laboratory, the Experimental Station and the Provincial Department of Agriculture, these disorders now have been eliminated. The crown rot of apple trees has been investigated by the Laboratory staff. The virus diseases of stone fruits are being studied and attention is being paid to vegetable diseases.

On Vancouver Island, on the grounds of the Saanichton Experimental Station, is another plant pathology laboratory. Here assistance is being given to the new vegetable seed industry by the examination of seed stocks, reporting on their health condition, recommending means for the elimination of the pathogenic organisms found, and by the inspection of the growing crops. In addition, certain studies are being made in the field of plant physiology as related to some field crop problems.

The Victoria Laboratory is devoted entirely to forest pathological work. At the request of the logging industry and the British Ministry of Supply the decays of Sitka spruce are being investigated from a small sub-station on the Queen Charlotte Islands. Closely co-operating with the Provincial Forestry Service at the Cowichan Lake Station, various diseases of Douglas fir and cedar are being studied.

Chemistry

The Division of Chemistry dates from 1886, when a small laboratory was established in the City of Ottawa. In 1889 the laboratory was transferred to the main building on the Central Farm. After a fire which destroyed the interior of the laboratory, a Chemistry Building was erected, occupied in 1896, enlarged in 1913, and further enlarged in 1935.

The scope of the work of the Division of Chemistry has been broad and practical. The application of chemistry, in the laboratory and in the field, to the

solution of every day problems of the practical farmer has been featured.

Investigational and research work has been wide and varied, with the desire constantly in mind to assist the varied phases of agriculture carried on in Canada—dairying and live stock, field husbandry, horticulture, tobacco and sugar beet culture, and a host of allied branches. The publications of the Division show that data obtained from this work have resulted in much valuable information for the guidance of farmers.

Under the existing organization of the Division there are laboratories for research in animal and poultry nutrition, soils and fertilizers, food investigational service laboratories for the routine analysis of agricultural products. In recent years much effort has been devoted to a study of the role of vitamins in animal and plant nutrition.

The work undertaken in Animal Nutrition includes studies on digestibility and metabolism, special studies of nutritional disorders, toxicity of feeds and of analytical methods as applied to problems in animal nutrition. The work on digestibility has been done with cattle, sheep and swine, and has had as its object the establishment of reliable tables for the digestibility of Canadian feed stuffs. Work has been done on the biological value of protein substitutes and several tests have been conducted with sheep to determine the value of urea in the ration of ruminants. A colony of rabbits is maintained to aid in the examination of feeds for poisons or toxicity.

The work in soils and fertilizers is of two types, investigational, and service to other Divisions of the Department of Agriculture. The investigational work is being centred at the present time on the study of soil colloids and their relation to the fixation of applied phosphorus and to soil fertility in general. Several investigations are under way, dealing with physiological disorders and root rots of plants, in an attempt to find the relationship of such disorders to soil composition. Co-operative experiments are being conducted with the Experimental Farms Service in studies of fertilizer requirements of different soils with respect to the crops being grown. The chemical service given to other Divisions of the Department of Agriculture includes the analysis of profile soil samples collected in the soil survey work of British Columbia, the Yukon, the N.W. Territory and Ontario. The analysis of farmers' samples has recently increased in volume.

The main work of the Food Investigation laboratory is the analysis of various products required for the administration of several Federal Acts. These include the examination of packing house products and export samples of the Meat Board and the examination of processed fruits and vegetables, processed milk products, and dried whole egg powders for the Special Products Board. Investigations are in progress in an attempt to improve the quality of processed foods. One such investigation concerns the cause of rancidity in cheddar cheese, and another the problems relating to the maple products industry.

The work in Plant Chemistry may be divided into that dealing with routine analyses for other sections of the Division, and for other Divisions of the Department of Agriculture, together with investigational work on the utilization of agricultural products, and of problems in horticultural chemistry. Chemical service is given to Divisions of the Experimental Farms in their studies on

the improvement of the quality of hays, pastures, cereal grains and other feeding stuffs. Several hundred analyses are made annually on the properties of oil from oil-bearing seeds, such as soybean, flax, sunflower, safflower and mustard. A special staff is engaged in problems connected with horticultural chemistry. This staff is making a special study of dehydration of vegetables and the processing of fruit juices. Analyses are made, at various stages of dehydration and storage, of the moisture, vitamins and sulphur dioxide content. The nutrition of orchards and the cause of certain physiological disorders are also being studied, together with the use of insecticides and fungicides.

Branch laboratories are situated at Kentville, N.S. and Summerland, B.C. These laboratories deal with the various problems arising out of the specialized type of agriculture found there.

A biological laboratory for Vitamin Assays was established in 1940 and its function is to conduct all the vitamin assays required by the Department of Agriculture. This includes routine assays required for the administration of Federal Acts, investigations dealing with methods of assay and studies of the vitamin requirements of animals and poultry, and the effect of treatment and storage on the vitamin content of food-stuffs for both animals and humans. It is not concerned with the control of those human foods which are dealt with by the Department of Pensions and National Health. The biological laboratory is equipped to make both rat and chick assays, and the chemical laboratory has facilities for the determination of most of the vitamins. Collaborative tests are conducted with other vitamin assay laboratories in both the United States and Canada.

In the conduct of chemical analysis of soil survey samples the Division has co-operated with Experimental Farm Service, the Ontario Agricultural College and the University of British Columbia. Similar arrangements have existed for a period of years with the same institutions, the Ontario Research Foundation, and Macdonald Agricultural College in regard to vitamin and riboflavin assays.

Entomology

The formal service to Canadian agriculture in the protection of crops from insect attack began in 1884 with the appointment of an Honorary Entomologist to the Dominion Department of Agriculture. This was followed in 1887 by the appointment of an officer as Dominion Entomologist and Botanist to the staff of the Experimental Farms Branch. In 1908 a definitely organized service was established under the title of the Division of Entomology of the Experimental Farms Branch. In 1910, with the passage of the Destructive Insect and Pest Act a plant Inspection Service was formally established within the Division of Entomology and in 1914 following the necessity for further expansion of insect control work throughout Canada the Division of Entomology was separated from the Experimental Farms Branch and established as the Entomological Branch of the Dominion Department of Agriculture.

In the early days of its development the staff was extremely limited and the work was carried on entirely from Ottawa. By 1912, however, six field stations were established. By 1914, nine field laboratories had been set up, each in charge of a trained entomologist. By

1924 the number of field stations had increased to twenty. At the moment (1945) the service is rendered from twenty-nine field laboratories, summer study centres, some with considerable staff, not being included in this total. With the re-organization of the Dominion Department of Agriculture in 1937 the Entomological Branch was organized as a Division of Science Service. The Inspection Service under the style, Division of Forest Pest Suppression, as organized within the Entomological Branch in 1919, was separated from the Division of Entomology and attached to the Production Service, to be known as the Division of Plant Protection.

The Division of Entomology is one of the six Divisions in Science Service of the Dominion Department of Agriculture. Its activities are carried on under the immediate direction of the Dominion Entomologist. Through its staff it conducts investigations in respect to insects, mites and roundworms with special reference to those of economic importance, and has chiefly for its object the development of control methods of value in protecting the products of agriculture, forestry, industry and man from damage, injury and loss by insecticidal, cultural and biological methods. The results of studies are made available to the public by appropriate publications such as bulletins, circulars, spray calendars, posters, maps, reports, lectures and advice by direct correspondence. Its primary function is accepted as being investigational but it holds itself in readiness to assist associated services, provincial services, municipalities, business organizations and individuals by co-operation, special investigations or extension and organizational work in any entomological control problem in respect of which its resources or knowledge would be of advantage.

The Division carries on its work through a headquarters located at Ottawa with a staff distributed throughout Canada in 29 laboratories of which there is at least one in each province. The laboratories are located at points of greatest advantage in dealing with the problems under study. In as much as closely related problems are studied at several laboratories, the Division is organized into units, some of which have laboratories in each province as in the study of insects attacking field and vegetable crops. Others though involved in a Dominion-wide activity carry on their work from a central laboratory, as for example, studies for biological control of insects which are centred at Belleville in a single laboratory. The major units under which the work is conducted consist of field crop insect investigations, forest insect investigations, fruit insect investigations, systematic entomology, biological control, livestock insect investigations, stored product insect investigations, household and medical investigations.

The field crop insect investigations unit has permanent laboratories established in each province and, mentioning only the principle problems, is concerned with investigations for the control of vegetable insects and the roundworms of agricultural crops at the Ottawa laboratory; potato and turnip insect pests in Prince Edward Island, potato aphids and the distribution of potato diseases in New Brunswick; potato aphid and the control of insects attacking crops in southern Quebec; the control of insect pests of sugar beets, beans, tobacco and corn in southern Ontario; the control of grasshoppers, insects attacking prairie vegetable crops, oil seed crops and prairie bush and tree fruits in Manitoba; wire worms, cultural control of grain insects, red-backed cutworm and its allies in Saskatchewan; wheat stem

sawfly, pale western cutworm, grasshoppers, Say stink bug, sugar beet insects, canning crop insects in Alberta; grasshoppers, potato flea beetles, and insects attacking hops, vegetable seed crops, carrots and other vegetables in British Columbia.

The forest insect investigations are carried on through laboratories in New Brunswick, Ontario, Manitoba, Saskatchewan and British Columbia. In Ontario the studies at the moment involve investigations of the ecology of forest insects and the control of spruce budworm, sawflies attacking coniferous trees, insects attacking shade trees and investigations to determine the value of insecticides in the control of forest insects by the use of airplanes. In New Brunswick the studies are particularly concerned with forest management in the control of spruce budworm, the control of the bronze borer, beech coccus and the control of forest insects by diseases. In Manitoba, the studies are primarily concerned with the spruce budworm, the rate of deterioration of timber killed by fire and insects and the possibility of its salvage in merchantable condition. In Saskatchewan study is especially concerned with the protection of prairie windbreaks and shade trees from insect attack. In British Columbia the more important studies involve the control of pine bark beetles, wood borers, and insects defoliating coniferous trees both in the interior and coastal regions. In addition to the study of particular insects, one of the most important activities of this unit consists in carrying on the Forest Insect Survey in which, with the co-operation of all official forestry services and the forest protection services of the lumber industry, a very careful appraisal of the insect conditions is maintained annually and published in the form of a report for the information of the forest industries, the forest protection services and entomologists in appraising the probability, location and extent of forest insect outbreaks.

The fruit insect investigations unit is primarily concerned with studies of insects attacking tree and bush fruits as well as assuming responsibility for the co-ordination of the study of the use of insecticides in insect control. Laboratories are associated with the centres of fruit production in the provinces of Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia. The studies have for their object the control of all fruit pests and the invention of satisfactory spray programs for the relatively similar groups of insects in each area.

Included among the insects under study are codling moths, aphids, fruit flies, leaf rollers, budmoths, mites, pear psylla, tarnished plant bug, apple and plum curculio, peach and other borers, grape berry moth and grape leaf hopper.

The investigations of insecticides are carried on in each province and fruit area as climatic variations require, and such new and interesting insecticides as DDT are in course of exploitation with the greatest of vigour and thoroughness.

The systematic entomology unit confines itself to the study of insects as zoological specimens. It has no responsibility in control work. It serves the whole Division and other institutions and students in Canada and elsewhere in establishing the identity of their specimens, conducts faunal surveys and maintains the National Insect Collection. By intense study of the material in the Collection, the unit prepares and improves keys to the identity of insects for the use of other officers on the staff and scientists in general.

The biological control unit is concerned primarily with the study of parasites of insects and their exploitation in the control of insect pests. The work is carried on from an insect parasite laboratory at Belleville, Ontario and extends upon occasion into all provinces. The work consists of the collection and redistribution of native parasites from districts where present to areas where not present, the importation of parasites likely to aid in the control of noxious pests, from foreign countries, their multiplication in the laboratory and distribution in the field, orchard or forest. The particular groups of parasites dealt with change from year to year. The collection, propagation and distribution activities, however, for 1944 embraced parasites designed to aid in the control of the following insect pests: the European spruce sawfly, larch sawfly, European pine sawfly, leconte's pine sawfly, the fir sawfly, pine shoot moth, larch casebearer, codling moth, European corn borer, European pine moth, greenhouse whitefly, greenhouse mealybug and orchard mealybug. Liberations were made of one parasite or another in the Maritime Provinces, Quebec, Ontario and British Columbia.

Livestock insect investigations are carried on from a laboratory at Kamloops, B.C., and embrace primarily the study of fleas, ticks, sheep ticks, lice on domestic animals and warble fly. Warble fly extension work which is being carried on very vigorously at the present time in the Prairie Provinces is centred at the Lethbridge laboratory where some warble fly investigations are also in course.

Stored product insect investigations are carried on primarily from a laboratory at Ottawa in co-operation with the Board of Grain Commissioners from their laboratory in Winnipeg. The studies have for their object the investigation and control of insects injurious to grain in storage, in warehouses, interior and terminal elevators and in transit by rail or boat. In addition, studies embrace the control of insects in stored manufactured products such as dehydrated fruits, vegetables, milk and eggs, as well as cheese, furs and military stores. An interesting activity during 1944-45 was the organization of elevator operators' schools with a view to instructing elevator operators in the sanitation of elevators and mills.

Household and medical entomology is concerned primarily with the control of household pests, biting and sucking flies and such insects as might be concerned in the distribution of diseases of man or animals. Circumstances arrange that the work is primarily concerned with the control of head and body lice, bedbugs, cockroaches, meal moths, black flies and mosquitoes. The studies include control in domestic houses, the open field, lumber camps, hospitals, schools and barracks.

Co-operative Relationships.—The type of co-ordination and co-operation found in the grasshopper control work in British Columbia and the Prairie Provinces characterizes the relationship between Dominion and provincial activities in entomology. In field crops it is illustrated by the co-ordinated investigations in connection with the study and control of the European corn borer in Ontario and the fruit insect work in the same province for many years. White grub and pea moth investigations in the province of Quebec were in the first instance largely carried on by Dominion officials but were made available to the Provincial Entomologist, and the first white grub control bulletin appli-

cable to Quebec conditions was published by the Province in joint authorship.

In British Columbia the investigations of orchard insects, among others, was carried on chiefly by the Dominion Government officials and the results made available for the use of the Province. The planning of the work and the associated extension efforts were co-ordinated with the needs and timing of the official provincial horticulturists. Similar arrangements obtained in connection with potato beetle problems, officers engaged therein being loaned from one service to the other and men and equipment as required used in common. At the present time this co-ordination continues, especially in the joint effort between Dominion and provincial services in co-operation with the entomologists of the United States Bureau of Entomology and plant quarantine in an effort to control the pear psylla.

An example of co-operative relationship in forest insect control is provided in Ontario, where in 1945, the Provincial Department of Lands and Forests built a laboratory at Sault Ste. Marie expressly for the carrying on of forest insect investigations by the Dominion Division of Entomology. This building is to be staffed and equipped by the Dominion Department of Agriculture and serve as the headquarters for Forest Insect Investigations in that Province.

In the same spirit for several years, the Department of Lands and Forests in New Brunswick has made an annual grant towards the prosecution of forest entomological work carried on by the Dominion Government, and has participated in the construction of a laboratory in that province in connection with the study of the possibility of the reduction of susceptibility of coniferous forests to outbreaks of spruce budworm by forest management.

Plant Protection

The work of the Plant Protection Division is based primarily on the protection of plant growth generally from introduced species of insect pests and new plant diseases. It includes efforts to eradicate or control pests of foreign origin which may become established in Canada; also the administration of Seed Potato Certification throughout Canada since 1938. The work is carried out under the regulations of the Destructive Insect and Pest Act.

This type of plant protection was used first by the Province of Quebec. Historical records show that in 1805 an "Act for the Preservation of Apple Trees in the Parish of Montreal" was passed. This Act referred to the control of canker worm. By 1922 all the provinces had on their statute books one or more acts dealing with the protection of plants. Measures taken by the provinces range from an act to incorporate an Entomological Society to an act to provide for the extermination of agricultural pests.

The Dominion Department of Agriculture first took action in 1898 when an "Act to Protect Canada Against the Introduction of the Insect Pest known as the San Jose Scale" was passed. This Act was the first legislation affecting importation of plant material and dealt only with host plants of this pest from infected countries or areas. In 1910 "The Destructive Insect and Pest Act" was passed and the San Jose Scale Act repealed. Since that time twenty-two regulations have been passed dealing with importations from other countries and ten

dealing with the movement of host plants of insect pests or diseases, domestically, and one covering the certification of apple exports on account of apple-maggot.

By Order in Council of April 21, 1922, "The Destructive Insect and Pest Act Advisory Board" was established for the purpose of advising The Minister with respect to desirable changes in the regulations under the Act or additions thereto.

In 1914, "The Seed Potato Certification Service" was organized by the Dominion Department of Agriculture as a result of a survey which showed that the potato crops were being seriously reduced by virus diseases. The function of the service is to assist and supervise the production of disease-free seed potatoes, true to variety and type from good and profitable yields could be obtained. The project is based on the removal during the growing season of weak, diseased and foreign plants and the multiplication of tubers produced from healthy and vigorous plants. Permanent standards were adopted covering both field and tuber inspections. This work has been conducted in all the Provinces at one time or another and in some cases in co-operation with provincial staff.

Divisional activities include the formulation and enforcement of regulations under the Destructive Insect and Pest Act; the inspection of imported and exported plants and plant products for the presence of insects and diseases harmful to vegetation; the treatment of affected shipments, or their refusal of entry or of export, as required; the operation of fumigation stations; the maintenance of domestic quarantines; the carrying out of surveys in connection with the spread, control or eradication of introduced pests; the issuance of certificates of health covering the export of plant material to meet the specific requirements of importing countries; the establishment of standards governing the production of certified seed potatoes, and the supervision of production and shipment by inspection in the field, in storage and at shipping point; the development and supervision of tuber indexing and tuber units to improve and multiply foundation stock seed potatoes; the issuance of official tags for crops conforming to Canadian certified seed potato standards; and advice to growers on modern methods of seed potato production.

Plant inspection staffs are maintained at Halifax, Saint John, Quebec, Montreal, Ottawa, Toronto, Niagara Falls, London, Windsor, Winnipeg, Estevan, Vancouver and Victoria.

Certified seed potato inspection staffs are stationed at Charlottetown, Kentville, Fredericton, Ste. Anne de la Pocatiere, Ottawa, London, Guelph, Winnipeg, Edmonton, Vancouver and Saanichton.

The import and export of plant material has been materially reduced by war conditions. However, the total volume of work performed has increased through the extension of normal activities to include various war service projects such as: (1) inspection of boats and storage premises to determine and control insect damage to foodstuffs; (2) examination of dehydration plants and their products with the object of preventing wastage due to insect attack; (3) tests with different fumigants to destroy insect outbreaks in food products; (4) investigations on the use of "aerosols" in applying insecticides; (5) regular examination of samples and debris from grain and dehydrated products to detect the presence of insects or mites.

In seasonal field project work attention is still being paid to apple maggot infestation, brown tail moths, pear psylla and Japanese beetle. The inspection and certification of potato for seed purposes is continued. A new regulation was put into effect requiring all seed growers to plant either Foundation or Foundation A grade potatoes. Regulations have been established governing the sale of potato eyes.

There is also direct joint action between officers of the Dominion and the provinces. A good illustration of this type of co-operative action is to be found in the apple maggot control work.

Inspection of orchards to determine freedom from this pest has been carried out co-operatively by the units of the Dominion and Provincial Governments in Ontario and provinces east thereof since 1933. Policy with reference to the control of the insect is determined by a Federal Apple Maggot Advisory Committee consisting of representatives of the Dominion and each provincial Department of Agriculture concerned. The units of Government participating vary in the different provinces but, as an example, in Ontario men are transferred to or employed specifically for this work by the Plant Production Division, the Division of Entomology, the Fruit and Vegetable Division of the Dominion Government, together with the Ontario Fruit Branch and the Ontario Agricultural College.

Similar co-operative action has been taken in the case of the scouting and eradication of the Gypsy Moth in Quebec and New Brunswick, the European Corn Borer in Ontario, the Japanese Beetle in Ontario, the Pear Psylla and the San Jose Scale in British Columbia.

NATIONAL RESEARCH COUNCIL

The National Research Council of Canada came into being during World War I when it was realized that the mobilization of scientific resources was as important as the mobilization of manpower or any other resource. Initially, the Council functioned as a co-ordinating body on research problems between Government departments, scientific institutions and important industries. In 1924, the Canadian Parliament passed the Research Council Act establishing the Council as a body corporate whose principal object was to ensure united action for the best utilization of our natural resources and the development of Canadian industries and trade. It was to be an agency for pooling the ideas of the best scientific minds in the country and aiding research by all available means on problems of national importance.

The soundness of this policy has been vindicated by the important role Canadian science has played in World War II. The existence of a national organization to co-ordinate and promote research activities was of inestimable value not only to Canada but to the Empire. The work of the Council during pre-war years was largely responsible for building up a body of trained scientific personnel who have contributed immeasurably to the Canadian war effort.

The Council functions in a variety of ways. It operates directly a number of scientific research laboratories covering the fields of physics and electrical engineering, chemistry, mechanical engineering and applied biology. The far-reaching function of stimulating and correlating scientific work in the entire country is

achieved principally through associate committees. Also, research men in the universities and other laboratories are encouraged and aided in their work by the awarding of assisted research grants. And finally, scholarships are made available to help promising students complete their university training and do post-graduate research.

Although research on behalf of agriculture has formed a small part of the Council's total scientific effort, its value and importance are no less significant. Work carried on in the Ottawa Laboratories and that planned for the new Prairie Regional Laboratory is principally concerned with the development and improvement of industrial processing, storage and transport of foods, and industrial utilization of agricultural wastes and surpluses; but important work more directly related to agriculture is also being done.

A number of associate committees co-ordinate and support agricultural research and on each committee are representatives of the agricultural organizations interested in its special work. Because of its wide interests, the Department of Agriculture has representatives on a large number of these committees. Chief of these is the Associate Committee on Grain Research in which the co-operating organizations are the Board of Grain Commissioners, the Dominion Department of Agriculture and the Universities of Alberta, Saskatchewan and Manitoba.

The Associate Committee on Field Crop Diseases secures effective collaboration between the various departments and institutions interested in promoting the warfare against plant disease enemies. The Canadian Committee on Food Preservation covers all phases of processing, storage and transport of perishable foods.

Experience has shown that even slight financial assistance enables many scientists to utilize more fully the equipment already at their disposal and to supervise additional investigations without neglecting their normal work. The plan of assisted research was instituted in order to obtain the greatest possible utilization of the research ability and technical equipment available in Canadian universities, and incidentally to provide training for a large number of younger scientists. Grants are made only for projects approved by the Council and to scientists of established reputation whose laboratories already contain the equipment normally used in their field of work. The funds may be used to hire additional assistance or to purchase special equipment, but the grantee must provide his services without charge. Much of this work has been of direct assistance to agriculture.

The Council's scholarships are intended to enable students who have given distinct evidence of capacity for original research to continue the study of science, with the view of aiding its advance or its application to the industries of the country. The number of research workers available for service in Canadian industries, universities and Dominion and provincial services in the present war has been very considerably increased by this means. Agriculture, together with all other industries, has benefited thereby.

Any detailed account of the National Research Council's contribution to agriculture is beyond the scope of this brief outline. However, the highlights of some of the work in progress in its own laboratories at the present time are given below.

Research on Plant Products

Cereal Grains.—Fermentation.—Since butylene glycol may be used as a starting point for the manufacture of synthetic rubber, a study to develop suitable production methods by the fermentation of wheat mash was initiated as a war project in co-operation with the Northern Regional Research Laboratory of the United States. In the initial stages assistance was also rendered by the University of Alberta, Dominion Department of Agriculture and several American industrial concerns. The process developed in the laboratory is now being tested in a pilot plant to determine the practicability of its commercial production. Many possible uses for butylene glycol are being carefully investigated: one of the most promising is as an anti-freeze. Its possibilities for conversion to more valuable products are also being studied.

This is recognized as the largest "chemurgic" research project in Canada at the present time. The pilot plant can be used for studying problems in the entire field of industrial fermentations.

To meet the enormously increased wartime demand for industrial alcohol, it was necessary to convert distilleries to the use of wheat owing to the shortage of corn and molasses. Technical advice was given to help solve many of the industrial problems connected with this change. Several surveys have been made on the problem of blending alcohol with gasoline for motor fuel.

Technical enquiries are answered on various industrial fermentations and investigations on the production from farm products of such chemicals as: acetic, lactic and citric acids; butyl alcohol and glycerol. Studies are made as time and facilities permit.

Separation of Wheat Fractions.—Because of war shortages of starch and starch products in Canada, an investigation was initiated to develop a satisfactory commercial method for the separation of starch and gluten from wheat. A simple, mechanical-separation process, adaptable to various grades of wheat, has been successful in the laboratory and is now being tested on a pilot-plant scale.

Starch Studies.—Investigations include conversion of starch to syrups and sugars, improved methods of starch analysis for use in fermentation industries, and miscellaneous studies relating to industrial uses.

Cereal Chemistry.—Extensive investigations have been made on the malting quality of barley, the assessment of quality in plant breeders' samples of wheat and barley, grain drying, moisture testing, baking studies, gluten proteins, and wheat germ. These studies have led to the establishment of standards and the use of superior apparatus for test purposes. It is proposed to intensify certain aspects of this work in the New Prairie Regional Laboratory.

Wheat Straw.—Consideration has been given to the use of wheat straw for the manufacture of cellulose acetate. A fundamental study has been made of the resins obtainable from wheat straw lignin and their use in forming plastics. It is proposed to continue at the Prairie Regional Laboratory certain investigations on the industrial utilization of straw, especially as related to its direct use as a fuel or insulating material.

Oil Seed Crops.—Surveys.—The Associate Committee on Grain Research and the Wartime Prices and Trade Board co-operated early in the war in making a complete survey of the domestic oil situation. A survey of the

extensive literature on Soya beans was made for scientists working in that field.

Extraction and Expression Studies.—The Dominion Department of Agriculture, the Associate Committee on Grain Research and several commercial firms are co-operating in a study to determine the suitability of existing plant equipment for the extraction or expression of new oil seed crops.

Processing Studies.—A shortage of edible fats led to an investigation into the feasibility of using cheap domestic vegetable oils as a substitute for imported oils. In co-operation with the Ontario Research Foundation, the problem of flavour reversion in linseed oil is being extensively studied.

Utilization of Elevator Screenings.—Industrial uses for refuse screenings collected at grain elevators have been examined and improvement on methods of oil extraction are being studied.

Assessment of Quality.—Tests suitable for assessing quality in small samples of flax seed are being developed as an aid to plant breeders.

New Uses for Oils.—New uses for vegetable oils are being investigated in relation to the requirements of the synthetic rubber industry.

Root Crops.—Various problems concerned with the commercial production of potato starch and new uses for the product have been given careful study.

An attempt has been made to develop a new variety of sugar beet to yield a higher sugar content.

New Crops.—Milkweed.—During the rubber shortage crisis a mechanical method was developed for the extraction of rubber-resin from milkweed. This process has been stepped up to a pilot-plant scale, and processing difficulties, encountered with milkweed pods, leaves, and stems, are being eliminated. The rubber from milkweed is of interest for certain specialized purposes and the resin may be of value in replacing some of the gums in short supply. Studies have been made on methods of treating milkweed floss to be used as a substitute for kapok.

Kok-saghyz (Russian Dandelion).—Rubber is being extracted in the pilot plant from batches of Russian dandelions as supplied to us from time to time by the Department of Agriculture, and its quality is being tested in the rubber laboratory.

Irish Moss.—Irish moss is a plant harvested from the sea, chiefly along the coast of the Maritime Provinces. Investigations are under way to develop a practical method for extracting gel from the plant, to be used as a substitute for agar agar in the food and pharmaceutical industries, and as a stabilizer for chocolate milk drinks and other food products.

Research On Animal Products

Meats.—Bacon processing.—Large-scale investigations initiated in 1936 on the curing and smoking of bacon were intensified with the outbreak of war as a result of the increased demand for bacon and the difficulties encountered in transportation to Britain. Studies aimed at maintaining and improving quality of Canadian bacon in the post war period are in progress.

Meat Storage.—Problems connected with quick-freezing, transportation, and transshipping of such perishables as beef, pork, mutton and bacon, have been given very careful study and will be pursued intensively again as soon as time and facilities permit.

Dehydration.—Methods have been worked out for producing a satisfactory dried pork product which can be compressed into palatable bars of high nutritive value. This product is of interest in the war effort and may have a place in post war relief programs.

Canning.—Development of canning processes to improve the keeping quality and nutritive value of pork and ham, was undertaken as a part of the war effort and will be continued in the post-war program.

Milk.—Dehydration.—Dried milk is of interest to the armed forces and is likely to become increasingly important in the feeding of populations in devastated countries. Processing methods are being studied with the aim of improving palatability and keeping qualities.

Butter Storage.—Canned butter supplied to our armies in the various theatres of war is subject to rapid deterioration, especially in the warmer climates. Means of improving processing methods and lengthening the storage life of the products are being sought.

Fats and Oils.—Studies are being made on methods for improving the stability and suitability of lard as an alternative for vegetable oil shortening in short supply during the war.

Poultry and Poultry Products.—Dehydration of Eggs.—The exigencies of war required the drying of large quantities of eggs for shipment to Britain. Work on this program in co-operation with the Department of Agriculture has resulted in a Canadian product of high quality. Continued improvement in processing methods will help to retain for Canada a fair portion of post war trade.

Preservation of Shell Eggs.—Uncertain war transport conditions lengthened the holding period for shell eggs exported to Britain, and inadequate storage facilities further increased the difficulties. Extensive investigations undertaken with the object of finding a practical method other than refrigeration for extending storage life, are being continued, since exports of shell eggs are again increasing.

Storage of Dressed Poultry.—Dressed poultry packages have been designed to maintain the level of humidity necessary to prevent surface drying during storage. Means have been found to delay the development of rancidity in the fat of stored poultry. Quick freezing and problems of related nature are given attention as time permits.

Distribution of Salmonella in Fowl.—The finding of mildly pathogenic organisms in dried egg powder led to the initiation of a study on distribution and transmission of such organisms by fowl.

Transport of Day Old Chicks.—High mortality rates in hatchery chicks has led to an investigation of the problem for industry.

Canning.—A major study on the canning of poultry was undertaken at the request of the Department of Agriculture. The results of the investigation led to the establishment of Canadian canned poultry standards. During the war tin shortages have minimized canning problems; however further work is contemplated for the post-war period.

Wool.—In co-operation with the Department of Agriculture, standards for wool grading have been established and the assessment of quality of various wools from experimental flocks is made as required.

General Agricultural Research

Plant Biochemistry and Physiology.—Studies have been made to determine how light and temperature interact to affect the growth of wheat in different parts of the country.

Suitable methods for treating plant and various forest tree cuttings with growth-simulating substances have been carefully studied. The work is being completed.

Nutrition.—Problems continually arise in connection with the vitamin content of army rations. An attempt has been made to find suitable carriers in which vitamins will remain stable over the wide range of conditions encountered by an army in the field.

Work designed to improve and develop methods of analysis used for determining the vitamin content of foods has been undertaken.

Engineering Problems

Warehouse Refrigeration.—The problem of humidification of refrigerated spaces at freezing temperatures for the storage of various agricultural products has been given considerable attention and it is planned to expand this work in the near future.

Marine Refrigeration.—Increased exports and losses of refrigerated vessels resulted in the initiation of a project to develop suitable equipment for refrigerating ordinary cargo spaces, chiefly for the transport of bacon. The improvement of this equipment which combines economy of operation with rapidity of installation and other requirements will make it applicable to a large number of peace time uses.

Railway Car Refrigeration.—Attention has been given to the improvement of railway car refrigeration systems. This is an important link in the chain of perishable food transport.

Farm Cooling Systems.—Consideration is being given to the development of various types of cooling units suitable for application to locker storages and on farms whether power is available or not.

Forestry.—Shelter Belt Trees.—Plant breeders are making good progress in the development of fast growing, hardy, shelter belt trees for prairie farmers.

Agricultural Meteorology.—Attention has been given to the relation between weather and the growth and yield of crops with a view to increasing the accuracy of estimating crop production. In addition, meteorological records are closely examined to determine the average climatological characteristics of particular agricultural regions.

3. ECONOMIC RESEARCH

PROVINCIAL

Consideration is given to agricultural economics in each of the nine Colleges of Agriculture, activities in this respect dating from about the time of the first World War. In Manitoba and Alberta, where agriculture is a faculty of the provincial university, the subject is dealt with by the staff of the university economics department. In Saskatchewan and British Columbia where the same kind of university organization prevails, departments concerned with agricultural economics are maintained within the college of agriculture. This form

of organization also prevails at each of the five Colleges of Agriculture in the eastern provinces.

In addition to the efforts on behalf of agriculture at institutions specializing in agricultural matters, most other universities and colleges give some attention to instruction and research in this field. At these institutions efforts are usually devoted to what might be termed the field of agricultural policy, whereas at the universities and colleges specializing in the agricultural field the research program in addition to the consideration of policy matters, includes, and usually emphasizes, problems that would be considered as somewhat nearer the farm level.

Research activities in agricultural economics at the various colleges and universities cover a wide field. Much of the work is done with the aid of student and graduate assistants, field work being undertaken in the summer and projects completed during the winter months as teaching duties permit. The work undertaken includes studies of provincial and national policies relating to agriculture and research relating to farm business, land settlement, land tenure, farm credit and indebtedness, assessment and taxation, land use and classification, levels of living, marketing and other subjects. Projects recently undertaken have been concerned with post-war irrigation possibilities, probable farm requirements for buildings and equipment, and economic considerations associated with the expansion of rural electrification.

The Economics staff works in close co-operation with other faculties of the college or university, with provincial Departments of Agriculture, Departments of Municipal Affairs, public utility bodies and other agencies. Much of the work done is also conducted in co-operation with the Economics Division of the Dominion Department of Agriculture. Frequently such projects involve other Departments and institutions on a three-way basis. Reference will be made to the conditions under which such work is undertaken when discussing the activities of the Dominion Agricultural Economics Division.

In addition to the work conducted by the colleges and universities, certain of the departments of agriculture also sponsor research in rural economics. The Quebec Department is the only one maintaining a special division for this purpose, but other departments, in one way or another contrive to support projects in this field. In Saskatchewan, Ontario and Nova Scotia divisions of marketing or co-operation are maintained to assist farmers and farm organizations. Some of these divisions engage in research work. Other departments give financial support to research projects conducted by the Economics staff of the college of agriculture or by the Dominion Economics Division.

DOMINION

The Agricultural Economics Division, Dominion Department of Agriculture, was established in October 1929. At that time it became the ninth Branch of the Department. Subsequently, with the consolidation of these nine Branches into four Services, the Economics Branch became a Division of the Marketing Service.

The Division is primarily a research agency and as such serves other Divisions of the Department, including those concerned with the administration of agri-

cultural policies. It also works with other Divisions of the Department of Agriculture and with other Departments of the Government in the conduct of basic research. Its activities in this respect range from surveys of ranching operations, conducted in co-operation with the Experimental Farms Service, to studies of food consumption levels and nutritional status done in co-operation with the Department of National Health and Welfare.

In the main the research activities of the Division, as represented in what might be termed "projects", have been confined to matters of interprovincial or national concern. At the request of provincial bodies assistance has been given on projects that were primarily of local or provincial concern. On occasions when projects of a provincial nature gave prospects of offering a solution to problems of wider concern, the Division has launched such work on its own initiative.

A large part of the research undertaken has been conducted with the assistance of the provincial departments and colleges. In the case of many projects sponsored by the Dominion, two or more provincial institutions are included. Such activities are conducted under an agreement with the provincial bodies concerned, the usual basis being that each institution contributes a stated proportion of the personnel and expense, including the cost of publishing any report that may result from the effort. The Division usually assumes responsibility for the direction of projects which it initiates and where projects are initiated by a provincial institution the provincial authorities accept responsibility for direction. The same arrangement prevails with respect to the publication of results; the initiating institution usually assumes the responsibility. Joint authorship or appropriate credit notes, depending upon the degree of participation, recognize the contribution of the co-operating institution. On occasions this co-operation has resulted in a Department publishing a report, the senior authorship of which is credited to the co-operating institution.

In the conduct of these co-operative arrangements provision is made for the assignment of staff to the centre from which the work is being directed. Thus provincial research workers have been assigned to Ottawa and Dominion staff members have been established at provincial institutions. In pursuance of this arrangement and having regard to the number of projects conducted in co-operation with certain provinces, particularly those remote from Ottawa, the Economics Division has located members of its staff on a more or less permanent basis at those institutions favourable to such an arrangement. Under this arrangement the Division maintains an office and staff at the Universities of Manitoba, Saskatchewan, Alberta and British Columbia where an extended program of research is under way in co-operation with the universities and the provincial governments.

The research program of the Economics Division is varied in nature. Although a unit of the Marketing Service its activities are in no sense confined to marketing. They include research in farm management and production costs, land settlement, land use and classification, farm finance, prices and statistics, domestic and foreign agricultural policy, labour relations, marketing, agricultural co-operation, consumer demand and consumption levels. The Division collects annually the statistics on co-operative activities in Canada and pub-

lishes the results. Its activities also include a major role in the preparation of the annual report on Agricultural Objectives.

Three regular publications, the *Economic Annalist*, *The Current Review of Agricultural Conditions in Canada*, and *Agriculture Abroad* are issued by the Economics Division, the second of these being undertaken in co-operation with the Markets Information Section, Department of Agriculture, and the Agricultural Branch, Dominion Bureau of Statistics.

Since the outbreak of war a substantial number of the staff of the Division have been on special assignments with the Wartime Prices and Trade Board, the Agricultural Supplies Board, the Food Board, Meat Board and other wartime organizations.

AGRICULTURAL STATISTICS

The main responsibility for agricultural statistics is centred in the Dominion Bureau of Statistics. The Agricultural Branch is responsible for annual estimates, while the Agricultural Division of the Census Branch is responsible for the compilation of the agricultural census taken every ten years for all Canada and every five years in the Prairie Provinces. These census enumerations provide the basic information for the annual estimates of the Agricultural Branch.

In the case of the annual estimates for some provinces co-operative arrangements have been worked out whereby some of the basic statistics are compiled in the offices of Provincial Departments of Agriculture and summary statements are forwarded to Ottawa for consolidation into Dominion totals. The Ontario Department of Agriculture has the most highly developed statistical office and undertakes to do a larger share of this work than any of the other provinces. The Quebec, Saskatchewan and Manitoba Departments compile certain statistics while the remaining provinces are almost entirely dependent on the co-operation of the Dominion Bureau of Statistics for their statistical data regarding agriculture. In the publication of statistics the Agricultural Branch of the Dominion Bureau of Statistics confines itself in the main to provincial and Dominion totals, while the reports issued by the provincial departments provide data on county or crop district areas. Statistics covered by the above arrangements include estimates of crop acreages, yields per acre and total production of field crops, fruits, vegetables and tobacco; numbers of live stock, values per head and marketing intentions; production of milk on farms, sales of fluid milk and production of all manufactured dairy products; numbers of poultry on farms and egg production and sales; numbers of fur bearing animals on farms and sales of pelts and live animals; estimates of farm capital, cash income from the sale of farm products and farm expenditures. Statistics are also collected on farm labour and wage rates and special studies have been undertaken on the per capita consumption of all foods.

Statistics of the industries using agricultural products as raw materials are collected and compiled by the General Manufactures Branch and the Fisheries and Animal Products Branch of the Dominion Bureau of Statistics. Information with respect to the marketing of agricultural products is, for the most part, collected and published by the Dominion Department of Agriculture.

With respect to crops, the Agricultural Branch collects information and publishes frequent statements during the growing season with respect to crop conditions and supplements these with preliminary estimates of production as soon as it is possible to give a reasonably accurate forecast on such matters. Surveys are also conducted periodically in an effort to determine the volume of certain classes of live stock likely to be marketed.

Regular publications of the Agricultural Branch include, the *Quarterly Bulletin of Agricultural Statistics*; *Monthly Wheat Review*; *Quarterly Review of Coarse Grains*; *Monthly Dairy Review*; *Monthly Report on Storage Holdings of various commodities*; *Wages of Farm Labour*; *Land Values*; and numerous statements on acreages of crops, volume of production and numbers of live stock on farms. The Bureau in general and the Agricultural Branch in particular acts as a service agency for the various Departments of Government. Much of the work of the Agricultural Branch is conducted in co-operation with the Agricultural Economics Division and other Divisions of the Department of Agriculture. Such co-operation extends to the general undertaking of projects concerned with the collection and analysis of statistical information.

4. EXPERIMENTAL FARMS

PROVINCIAL FARMS

Agricultural Colleges

There is an experimental farm associated with each of the agricultural colleges. These farms serve a three-fold purpose by providing the basis for teaching, research and experimentation, and demonstration activities. The activities of the farm are usually closely related to the various college departments. The latter are concerned with field husbandry, animal and poultry husbandry, horticulture, farm engineering, dairying, farm economics, and other matters.

While most of the college farms engage in an extensive variety of activities embracing almost all phases of experimental work, there is a tendency in most instances to stress activities in fields representing the more important types of agriculture found in the areas served.

A general livestock and horticulture farm is attached to the College of Agriculture at Truro. A certain amount of investigational work has been conducted, more particularly with fertilizers, lime, permanent pasture crops, silage crops, hay, grains and roots, and fruits. There are chemical and entomological departments which are carrying out scientific investigations relating to various phases of agriculture in Nova Scotia.

In Quebec the three agricultural colleges are operating farms. At the Oka Agricultural Institute, horticulture holds an important place; special attention is given to the breeding of livestock; research is being conducted in the manufacturing of better quality dairy products. Among the many activities experiments were conducted in cross breeding poultry; the preservation of leek; poultry feeds; and the use of steam heated beds for vegetables. The farm at Ste. Anne de la Pocatiere specializes in Ayrshire cattle and major experimental work is done in poultry and horticulture. Research in fruit and plant diseases has been conducted. Experiments were made on the fertilizing of potatoes, turnips and oats, and on potato pesticides. In addition, tests

on pasture fertilizing have been conducted from time to time.

The farm at Macdonald College has among other activities experimented in plant breeding, for example, oats, barley, clover and corn. The Agronomy Department of the College has continued to focus its attention on oats breeding for the purpose of combining resistance to smut with resistance to leaf and stem rusts. Experiments were made in feeding livestock such as the nutritional value of pasture herbage and the protein requirements of market pigs and poultry. In the case of market pigs the results indicated that the protein-energy balance requirement is independent of the level of feed intake and that diets for weanling pigs should carry between 15 and 18 per cent of crude protein. Experimental activities in treating soil for the control of common scab potatoes were continued over a period of several years.

In Ontario the farm at Guelph has done work in crop rotations, pasture improvement, livestock management, and horticulture. One or two illustrations will indicate the nature of these activities. In 1931, the Department of Animal Husbandry of the College, in cooperation with the Ontario Veterinary College, undertook a study of anæmia in young pigs. The mortality in young pigs was unusually high and brought great loss to the farmers of the Province. This study covered the uses of iron sulphate or reduced iron, ultra-violet rays, and different forms of vegetation in combatting this disease. Another illustration is the study of the mineral content of grasses and clovers taken from pastures and cultivated fields. The purpose was to aid in solving the mineral nutrition problems in Ontario. Results showed that there was a wide difference in mineral content in the crops. This was related to the soil and types of crops and had a definite effect on the health and productivity of livestock.

The operation of a farm is an integral part of the activity of the College of agriculture at each of the universities in the prairie provinces. Experiments and demonstration work are conducted in animal and field husbandry, in horticulture, in weed control, and dry farming. The work of the three College farms has centred on feeding experiments, cereal and forage crop breeding. These institutions have also featured agricultural engineering—the importance of farm machinery in western agriculture having emphasized the need for extended efforts in this field. The College of agriculture and the farm at the University of British Columbia are engaged in a variety of research and experimental projects with emphasis on fruits and dairy products, seed production, and fertilizers.

Other Provincial Farms

The various provinces have both provincial experimental and demonstration farms and, in some cases, schools were conducted on the farms. Farms are also operated by such institutions as jails, asylums and orphanages. The institutional farms do not engage in experimental work but have demonstrated good cultivation practices.

The provincially operated experimental farms act as service centres for farmers. The activities of the farms are closely related to problems within the province. In addition to experimental work these farms conduct demonstrations, arrange field days and in other ways take the results of their work to farmers.

In the Maritimes, at present, there are no provincially operated farms. The province of Quebec operates the recently established Deschambault Farm School. In Ontario the provincial department is responsible for the administration of the experimental farms at Ridgetown and Vineland and the demonstration farms at Kemptville, New Liskeard and Hearst. The Horticultural Experimental Station at Vineland in the centre of the Niagara fruit belt operated since 1906 conducts experimental work in fruits and vegetables. Extensive tests in plant breeding and cultural methods are carried out. The Western Ontario experimental farm at Ridgetown has run experiments in fertilizers, plant diseases, and spraying.

Other activities at Ridgetown include experiments in bean cultivation, use of insecticides for potato plants, and the feeding of corn to bacon pigs. At Vineland, the additional activities include a spray service, studies of disease resistant varieties of vegetables, the production of clean rooted strawberry plants, experiments in variety of grapes best suited for winemaking, and so forth. At Kemptville seed cleaning and soil testing services were provided farms, and experiments in crop rotation have been conducted. The farms at Hearst and New Liskeard are concerned with a variety of problems confronted by farmers in frontier and transition areas.

In Manitoba, there are two demonstration farms, one at Birtle and one at Killarney. The farm at Birtle was developed along mixed farming lines. The farm at Killarney is for the purpose of demonstrating fruit growing and vegetable growing. The Saskatchewan Department of Agriculture operated the Lockwood Weed Research Station. Weed control experiments and demonstrations were carried on. In Alberta a farm is operated in connection with the School of Agriculture at Olds. Experiments in animal breeding, forage crops, rotation and horticulture are being conducted. Other provincial farms conducting similar work are located at Vermilion, Brooks, Sedgewick, Gleichen, Youngstown and Oliver. The Raymond and Claresholm farms were not operated during the thirties.

At Olds considerable work has been done on species and varieties of grasses best suited for pasture. Experiments have been conducted in rust resistant wheats, and in the growing of fruits. At Vermilion, tests concerned with the purity of wheat varieties have been conducted; also tests dealing with resistance of oats to smut. The Brooks farm has carried on varietal testing of corn, beans, tomatoes, potatoes, and onions.

The provincial farms have, in all cases, attempted to meet local and regional problems, to complement and supplement the work of the Dominion Experimental Farms Service.

DOMINION FARMS

The Experimental Farms Service, formerly the Dominion Experimental Farms, was established as a branch of the Dominion Department of Agriculture in 1886. Its function, as cited in The Experimental Farm Stations Act of that year is "the promotion of agriculture, by the dissemination of useful and practical information respecting matters connected therewith". Under the present organization of the Department of Agriculture the work of the Experimental Farms is to promote improvements in the practice of farming, by conducting experiments and research on practical farm problems throughout the Dominion, and by demonstrating under

actual farm conditions the results of such work wherever they can be usefully applied. To this end the Service operates a Dominion-wide network of Experimental Farms, Stations and Laboratories, so organized as to combine the advantages of centralized research with wide contact and co-operation with farmers and other agricultural agencies. At headquarters on the Central Experimental Farm at Ottawa, close touch can be maintained with the ever-changing technique of Canadian farming and measures quickly instituted for the solution of farm problems.

History and Development

Under the terms of the Act there was established at Ottawa a Central Experimental Farm which would serve the Province of Ontario and Quebec; together with one at Nappan, N.S., for the Maritime Provinces; one at Brandon for the Province of Manitoba; one at Indian Head for the Northwest Territories; and one at Agassiz for British Columbia. By 1888 these farms were in operation.

The main lines of investigation to be pursued in the Experimental Farms were outlined in the Act. These included live stock breeding and nutrition; dairying; the testing of cereals and other field crops, grasses and forage plants, fruits, vegetables and trees; the study of seeds, fertilizers, plant diseases and insect pests; the investigation of diseases of domestic animals; and "any other experiments and researches bearing upon the agricultural industry of Canada, which are approved by the Minister".

The initial organization of the Farms Service, still maintained in essentials, provided that general research would be conducted on the Central Farm by officers specializing in agriculture (field crops and live stock), horticulture, plant breeding, botany and entomology, and chemistry; while experiments and demonstrations applicable to different regions would be conducted by the Superintendents of the various Farms. Specialists and Superintendents were severally responsible to the Director.

During the 59 years since its establishment the Experimental Farms Service has expanded with the development of Canadian agriculture to the present organization comprising, in addition to the Central Farm, 28 Branch Farms and Stations, 6 Sub-Stations, 8 Laboratories, 157 Illustration Stations and 51 District Experiment Sub-Stations. The work of research at the Central Farm, originally conducted by a handful of specialists, is now allotted to the ten Divisions of Animal Husbandry, Bees, Cereals, Economic Plant Fibre, Field Husbandry, Forage Plants, Horticulture, Illustration Stations, Poultry and Tobacco. In addition, several stations which have served their periods of usefulness have been closed and many lines of work developed on the Farms now constitute the functions of other branches of the Department of Agriculture.

The expansion of the Farms Service, both as regards the establishment of new stations and the progressive widening of fields of research, has been actuated by the growth, in acreage and complexity, of Canadian agriculture. It is interesting to note that from 1881 to 1941, practically the lifetime of the Experimental Farms, the acreage under field crops in Canada has increased by 270 per cent from 15,097,000 acres to 55,896,000 acres. In the same period the number of farms increased from 464,000 to 733,000 and the occupied farm land from

45,358,000 acres to 174,768,000 acres. Corresponding developments have taken place in the technique of farming, in improvements in crop varieties, live stock and equipment, and in the specialized skills which, taken together, make up the modern art of agriculture.

Much of the expansion in Canadian agriculture in the past 60 years has occurred in the Western Provinces. In 1881 the Eastern provinces had fairly well emerged from the pioneer stage of settlement. But at the inception of the Experimental Farms the first trans-continental railway in Canada, completed in 1885, was just beginning to open the prairies west of Manitoba to agricultural settlement. Little was then known of the potentialities and limitations of prairie soils. Existing farm practices, relatively crude as compared with modern standards, has not yet been adjusted to prairie conditions. In 1881 the total area under field crops in the present Provinces of Saskatchewan and Alberta was only 21,214 acres as compared with 31,827,199 acres in 1941. Under these conditions the establishment of the Experimental Farm at Indian Head in 1887 was most opportune. It provided the means of studying the problems affecting prairie agriculture as they emerged, and of conducting reliable experimental work in the introduction and trial of suitable crops and farm practices.

Gradually, with the increase of settlement and the growing complexity of agricultural production, together with the recognition of regional difference in soil, climate and the adaptation of crops and live stock, it became necessary to open new experimental stations, until each major farming district was so served. Later, as the peculiar needs of smaller districts became apparent the practice of conducting demonstrations and trials on a large number of suitably located private farms was adopted. Laboratories were set up at points where peculiar problems, requiring fundamental research were encountered. In this manner the services of the Experimental Farms have kept pace in some measure with continually emerging needs.

Incidentally, it has been the practice to reserve the title of Dominion Experimental Farm for the five original stations established by the Act. Subsequent establishments have been known as Dominion Experimental Stations or Sub-Stations, depending on the magnitude of the work undertaken. Most of the smaller units are either Illustration Stations, where part of a farm is employed in experimental work, or District Experiment Sub-Stations, where the entire farm is used, the latter being mostly located in the Prairie Provinces.

Altogether, from 1886 to 1945, Experimental Farms, Stations and Sub-Stations have been established at 40 locations of which 34 are presently in operation. Of the stations devoted to general agricultural experimentation the following, with the year of establishment indicated in brackets, are now in operation:

Charlottetown, P.E.I. (1909); Nappan, N.S. (1888); Fredericton, N.B. (1912); Ste. Anne de la Pocatière, Que. (1910); Lennoxville, Que. (1914); Normandin, Que. (1936); Ottawa, Ont. (1886); Harrow, Ont. (1923); Kapuskasing, Ont. (1918); Brandon, Man. (1888); Indian Head, Sask. (1887); Swift Current, Sask. (1920); Melfort, Sask. (1934); Scott, Sask. (1911); Lethbridge, Alta. (1906); Lacombe, Alta. (1907); Beaverlodge, Alta. (1915); Fort Vermilion, Alta. (1908); Agassiz, B.C. (1888); Prince George, B.C. (1939); Saanichton, B.C. (1915); Smithers, B.C. (1938); and Whitehorse, Y.T. (1944).

At all of the foregoing farms and stations the experimental work is based on complete farm operations suitable to the district served. The station at Whitehorse, Y.T., is actually located some 105 miles west of that point, on Mile 1019 of the Alaska Highway.

General service stations which have served their purpose and been closed include Cap Rouge, Que. (1910-1940); La Ferme, Que. (1916-1936); Rosthern, Sask. (1908-1940); and Windermere, B.C. (1910-1940).

Several of the stations are devoted mainly or exclusively to particular lines of investigation. Stations mainly engaged in fruit growing investigations are Kentville, N.S. (1912); Smithfield, Ont. (1945); Morden, Man. (1916); and Summerland, B.C. (1914). Vegetable production on muck soil is the object of work at Ste. Clothilde, Que. (1936), and tobacco production at L'Assomption, Que. (1928) and Delhi, Ont. (1933). The functions of the Experimental Fox Ranch at Summerside, P.E.I. (1925), and the Range Experiment Station at Manyberries, Alta. (1927) are implied in their titles. The Lethbridge Station, while engaged on general agricultural work, owed its origin in large measure to the need for experimental work on the large irrigation areas of Southern Alberta.

Of the specialized stations, two have been closed: the Tobacco Station at Farnham, Que. (1912-1940) and the Horse Breeding Station at St. Joachim, Que. (1920-1940).

Mention should also be made here of the Forest Nursery Stations at Indian Head (1903), and Sutherland, Sask. (1912) which supply tree planting material to farmers throughout the Prairie Provinces. These stations were established by the former Department of Interior in the years indicated, but upon the dissolution of that Department in 1931 were taken over by the Experimental Farms.

It is customary to refer to all Experimental Farms and Stations, excepting the Central Farm at Ottawa, as Branch Farms, a practice which will be followed below.

In addition to the laboratory facilities on the Central Farm, laboratories for special purposes have been established at outside points. These include the Cereal Breeding Laboratory at Winnipeg, Man. (1925); the Forage Crops Laboratory at Saskatoon, Sask. (1932), and the Soil Research Laboratory at Swift Current, Sask. (1936). Laboratories for the processing of fruit and vegetable products are operated on the stations at Kentville, N.S., Morden, Man., and Summerland, B.C. In 1944 a Pilot Fibre Flax Mill was opened at Portage la Prairie, Man., and a Wool Laboratory at Lethbridge, Alta.

Scope and Development of Experimental Farms Work

The work of the Experimental Farms Service may be divided into four main categories, namely: investigation, research, development and demonstration.

Investigation.—In this connection investigation implies mainly the recognition of problems in practical agriculture wherever they may arise, and the assembling of all information available on the causes and solution of such problems. The Experimental Farms organization, with centralized facilities of research and Branch Farms in all representative areas of the Dominion, is designed to facilitate the continuous and coordinated work of investigation, in order that known solutions to problems may be made known as quickly as possible, and that necessary researches may be instituted without delay.

In the earlier stages of their development the Experimental Farms represented the major Governmental source of information on the condition of agriculture in the Dominion. Latterly, other Government agencies have undertaken the work of agricultural intelligence, in some cases expanding work formerly performed by the Experimental Farms, but these still remain an important source of pertinent information.

Research.—The type of research conducted by the Experimental Farms Service ranges from continuous routine records of the various phenomena of agriculture, weather records, crop yields, records of performance of live stock, etc., to elaborate enquiries into the scientific principles underlying the technique of farming. The guiding principle in undertaking research is that it will possess practical application by or for farmers and that it can be best conducted in connection with the facilities of a network of farms. Much of this research is effected through the replication of experiments on a number of Experimental Farms, with the object of determining the effect on certain practices or treatments of varying environments or in finding the useful geographic ranges of various crop or live stock adaptations. Another feature of this work is that, through the widespread ramifications of Experimental Farms work, it is possible to direct the scientific resources of many agencies; Government Departments, the National Research Council, Provincial institutions and universities to the solution of agricultural problems.

Experimental Farms research is conducted on the project basis; that is, work on the solution of each problem under study, or on each related group of problems, constitutes a "Project". Projects are drawn up by the relevant Divisions at Ottawa, usually in consultation with the Superintendents of Branch Farms where the work is to be done or the solution required, and become effective on authorization of the Director. Some indication of the extent of this work is that in one year as many as 1,500 projects were in force. A single project may represent the full-time work of a large group of specialists, as with soil surveys, or be only the part-time responsibility of an individual.

Development.—Many Experimental Farm research projects result in the production of new varieties of plants or improved strains of live stock. In some such cases it becomes desirable or even necessary to develop the supply of new product to the point where it becomes available to farmers in general. Further, where these introductions come into general use, degeneration may result in a few generations from cross-breeding, etc., so that a continuous new supply of true-bred stock is necessary. Such activities constitute a type of development work which is a direct service to farmers.

Another type of development in which the Experimental Farms participate is the employment of trained Farms personnel in the development of various Government policies or programs, such as the Prairie Farm Rehabilitation program and dykeland reclamation in the Maritimes.

Demonstration.—Demonstration of results is an integral part of any experiment and inseparable from the work of the Experimental Farms. In this sense the field is wide and undisputed. Every Branch Farm is, by its nature, a demonstration farm.

Considerable work of a demonstrational nature is also conducted on Illustration Stations and District Experiment Sub-Stations. A main characteristic of these smaller units is that they are, in effect, outposts of the Experimental Farms, projecting for further trial the results of experiments into representative localities. Their function is both fact-finding and demonstrational.

It will be seen, therefore, that the demonstrational activities of the Farms are confined to the dissemination of information derived from Experimental Farm work. No attempt is made to enter the field of formal education.

With the foregoing in mind some reference may be made, from an historical viewpoint, to the nature of Experimental Farms work. When first established the Farms were, in large measure, "model farms", on which were brought together the best available practices, crop varieties, live stock breeds, etc., for trial and demonstration. Abundant opportunity existed, however, for investigation, research and development.

At an early date it was realized that the Canadian prairies were better adapted to cereal culture, especially as regards wheat, than to other forms of crop production. Indeed, economic conditions and geography combined to render wheat practically the only crop for which an export market was open. But the production of cereals on the prairies was attended by many natural hazards, including early summer frosts and low rainfall. To enable farmers to minimize the adverse effects of these hazards was among the early projects of the Experimental Farms.

To combat the hazard of early frost, investigations were started to find varieties of cereals with early-maturing qualities. In 1889 trials were made of 74 varieties of spring wheat, 49 of barley and 80 varieties of oats. In connection with wheat special attention was directed to varieties derived from the northern steppes of Russia and the elevated areas of India. This work was combined with a considerable amount of cross-breeding. In 1892 crosses made between the early-ripening wheat from India, Hard Calcutta, and Red Pife, then the standard wheat in Western Canada, resulted in the creation of the celebrated Marquis wheat. Marquis combined early maturing with high milling and baking qualities to such a degree that between 1907, when it was first released for trial, and 1915, it had taken the lead over all other varieties.

Marquis wheat, which was later to earn a knighthood for its producer, Charles Saunders, displayed in a striking manner the value of research in agriculture. It should be remembered, however, that Marquis was the result of a prolonged and painstaking process of plant breeding, in which thousands of crosses are effected, the vast bulk of which is finally discarded. From this work, moreover, many selections have been made, each with peculiar qualities for certain purposes, but whose introduction lacks the spectacular effects attending the introduction of Marquis. Subsequent introductions of spring wheat have been selected for resistance to drought, rust and sawfly attack. Parallel improvements have been effected in other species of crop plants. Briefly, these improvements have enabled agriculture in Canada to maintain production against increasing hazards and growing economic competition.

Plant breeding represents a phase of experimental work in which a centralized body of specialists, working with the co-operation of Branch Farm Superintend-

ents, is essential to full success. In other phases of the work, however, observations and trials on individual Branch Farms have had most useful results. This was true in connection with the introduction of the practice of summerfallowing in Western Canada by the Indian Head Experimental Farm, which occurred almost simultaneously with the introduction of Marquis.

The foregoing examples, one in plant breeding and the other in soil management, of the early application of experimental science to agricultural problems are typical of many lines of Experimental Farms work. They illustrate the combination of investigation, research and demonstration, and of development with plant breeding, of services which are made to the Canadian farmer. With the emergence of new problems, the progress of invention and advances in pure and applied science, the work of the Experimental Farms has become increasingly more technical and at the same time held to the practical level by the need of applying all findings under ordinary farm conditions.

It is not possible in a brief review to deal adequately with all important early developments in Experimental Farm work. In all parts of the Dominion a vast amount of investigational and research work has been accomplished. In the field of horticulture, for instance, Experimental Farm work on the introduction of improved varieties of fruits, vegetables and ornamentals has not only led to a steady improvement in Canadian orchards and gardens, but has materially promoted the founding of fruit and vegetable industries in new districts. Long time comparisons of different breeds of live stock have demonstrated what particular breed or breeds are best suited to various regional or local conditions. Rotation and cultural experiments with field crops have shown what cropping and tillage practices are most likely to prove profitable under different conditions of soil and climate. Further reference to such work must be deferred to the sections on Divisional activities below. Attention may be directed, however, to some of the more recent developments.

In the field of horticulture, problems of marketing, and the emergence of modern concepts of nutrition which place emphasis on year-round consumption of protective foods, have prompted research and development in the preservation and storage of fruits and vegetables by temperature control, juice extraction and dehydration. This work has already amply demonstrated its value in terms of utilization of by-products and simplification of shipping requirements.

Increasing mechanization of agriculture is creating an extensive field for the investigation, testing and demonstration of farm implements and machinery. This field lies mostly between the zones in which service can be normally expected from the manufacturers on the one hand, and the mechanical services which the average farmer can provide for himself on the other. Drainage, water supply, sewage disposal and land conservation engineering, farm building, construction research, adaptation of existing equipment to special uses, and a wide range of maintenance and repair problems are becoming, to an increasing extent, subjects of Experimental Farm investigation and research. In this connection, considerable attention has been directed to the design of labour-saving devices by the wartime shortage of man power. On the Central Farm at Ottawa and on the

Station at Swift Current, Sask., staff and facilities are being assembled for increased work in agricultural engineering.

Typical of modern developments in agricultural research is the practice of soil surveying, in securing an inventory of agricultural resources as regards the nature, location and acreage of various soil types. This work, based on modern conceptions of soil science, is proving its fundamental value in the fields of agronomy, land settlement and land utilization. Soil survey work in Canada may be said to have been started by the Universities of Saskatchewan and Alberta about the year 1921, although some tentative work was done elsewhere before that date. About 1929 the Experimental Farms began to provide financial assistance to provinces engaged in this work. With the inauguration of the Prairie Farm Rehabilitation program in 1935, soil surveys on the basis of Dominion-Provincial co-operation became an established program, and surveys on this basis are now in progress in all provinces.

Soil survey work presents an interesting example of Experimental Farm co-operation with provincial agencies in which the *modus operandi* has been evolved to suit the peculiar administrative organizations of different provinces. Under existing arrangements the Provincial Governments and the Experimental Farms Service each employs trained soil scientists for survey work in all provinces. In certain provinces these men work under the technical direction of the provincial colleges of agriculture, in others technical supervision is exercised by the Dominion soil survey staff. In nearly all provinces Provincial and Dominion soil survey personnel form single operating units. The soil survey staff of the Central Farm at Ottawa correlates the work between the provinces and, through the National Committee on Soil Surveys, facilitates the exchange of information. Reports and maps are generally issued as joint Dominion-Provincial publications. By these arrangements it is possible to conduct the work in a manner satisfactory to both Provincial and Dominion interests.

Altogether some 194,919,000 acres have been covered by soil surveys in Canada. Of this total, 54,039,000 acres were surveyed by provinces acting alone, with 39,139,000 acres covered before Dominion-Provincial co-operation went into effect. Co-operative surveys have been conducted on 144,561,000 acres, of which some 13,600,000 were covered only in preliminary or exploratory manner. It is probable that about two-thirds of the arable land in Canada has been covered by some type of soil survey. Actually, however, only a small portion of the territory has been covered in sufficient detail to be considered as sufficient for all purposes. A great deal of detailed surveying is yet to be done.

Co-operation, as illustrated above, is the basis of many Experimental Farm activities. For the most part, co-operative projects with other Services in the Department of Agriculture, other Federal Departments, the National Research Council, Provincial Departments and the universities are supervised by committees on which sit representatives of the Experimental Farms. With the growth of agricultural services throughout the country, and the increase in problems needing attention, the amount of co-operative work has become quite large. Altogether, the Experimental Farms are represented on more than 185 Committees, excluding those within the Service itself.

One main object of the use of cooperation is to ensure that every important problem in agriculture will receive the fullest application of existing services for its solution. Another, equally important, is to prevent unnecessary duplication anywhere of work or policy. Through the use of committees, there is a maximum exchange of information, by which the various staffs are kept up to date on all matters connected with agriculture.

Work of the Experimental Farms Divisions

With a few exceptions reserved for the Director's supervision, all work of investigation, research and development on Experimental Farms is conducted by Divisions. This applies both to the Divisions at Ottawa and to the technical personnel on Branch Farms. Reports on projects are made by the Branch Farm personnel to the Director through the appropriate Divisions at Ottawa, while matters of an administrative nature are referred directly to the Director's Office. Each Division at Ottawa has its own staff, technical and clerical, while the staff on each Branch Farm forms a single administrative unit under the Superintendent.

Animal Husbandry

Experimental work with live stock, at first one of several duties of the Director, was assigned in 1890 to the Agriculturist, who also supervised the work in field crops. In 1911, expansion in work and staff made necessary the segregation of live stock work into a single Division of Animal Husbandry.

The work of the Division of Animal Husbandry includes systematic research in the breeding, feeding, housing and management of the various classes of live stock on the farms and ranches of Canada. This work covers beef and dairy cattle, horses, sheep and swine.

In the studs, herds and flocks of the Experimental Farms there is represented practically every breed suited to general and special conditions of soil and climate. This selection of breeds has been arrived at only after years of trial. Unsuitable breeds have been eliminated. Desirable breeds have survived and been subject to improvement through the best methods of breeding and management.

Breeding Work.—Breed comparisons of cattle are made from the standpoint of suitability and economy of production. In these comparisons the feed requirements and cost of production are secured and compiled. One main line of research on beef cattle has been directed through breeding trials to the development of a single type of Shorthorn which, by combining good beef qualities and reasonably high milk production, will prove satisfactory over the wide range of farming conditions encountered throughout Canada. Other Research breeding projects deal with the improvement of Hereford cattle for range conditions and the value of various crosses in beef production.

With dairy cattle the breeding work is planned to develop tested strains and proven sires, to build up through them more prepotent races of cattle, and so to reduce the annual wastage from heavy culling which the use of untried sires makes necessary.

Horse breeding, which has declined somewhat in importance in recent years, is still promoted to some extent. Studs are maintained at many Branch Farms, each headed by an outstanding stallion which is avail-

able for service to farmers' mares at a nominal fee. These studs demonstrate the improvement possible through the use of superior animals and supply material for the study of horse breeding problems.

Sheep breeding problems are concerned largely with the development of an early maturing lamb of good carcass, conformation and quality. Attempts are being made to develop a new breed of sheep adapted to Western range conditions.

In response to the demands of the export bacon trade, especially under wartime stimulation, there has been a gradual reduction, through selective experimentation, in the number of swine breeds produced in Canada.

At Buffalo Park, Wainwright, Alta., animal hybridizing work with domestic cattle and bison is in progress, its object being to evolve a cross combining the hardiness of the buffalo with the good meat qualities of cattle.

Animal Nutrition.—This work includes experiments with the feeding of live stock, tests of farm-grown feeds—hay crops, ensiled crops, succulent roughages; tests of grain, mill feeds and mill by-products from the standpoint of economy in production; experiments with variously compounded rations to learn their effect on milk production, beef and lamb production, and on the type, quality and carcass formation of market hogs.

Fundamental research in animal nutrition is conducted in cooperation with the Division of Chemistry, Science Service, and includes the determination of digestibility of various feeds, and various related factors. This basis of this work is the comparison of analyses of feed consumed by test animals with analyses of the corresponding excreta.

Housing, Equipment and Disease Control.—Studies are made of the housing of live stock under the varying climatic conditions of Canada, working always toward the type of building which will combine maximum utility with minimum cost, and including tests of live stock, building equipment and accessories.

Branch Farms.—While some form of live stock work is conducted on all Branch Farms, certain Farms have been selected for special purposes. The Range Experiment Station at Manyberries, Alta., was established principally to conduct studies in problems affecting the western ranching industry.

Artificial Insemination.—This practice, whereby the usefulness of outstanding sires can be greatly increased, has been developed to a high level of efficiency.

Dairying.—Experiments are conducted with the handling, preparation for market, and manufacture on the farm of dairy products—milk, butter and cheese; and on the introduction or origination of new varieties of cheese. Co-operative studies are made of bacteriological problems, especially as regards the use of milking machines and other dairy apparatus.

Co-operation.—This Division co-operates extensively with various agencies engaged in live-stock work. Co-operation is maintained with the Ontario Agricultural College on artificial insemination; with the University of Saskatchewan on sheep breeding with the National Research Council in determining the grade and clean wool yield of various test breeds of sheep, and in various programs and studies conducted by the other Services of the Department of Agriculture.

Bees.—Although the first apiary of the Experimental Farms Service was established at Brandon, Manitoba, in 1891, and the apiary at Ottawa in 1893, it was not until 1915 that a separate Division was created to take care of this particular phase of agricultural endeavour.

Shortly after the Division was formed, other apiaries were started at Branch Farms in all of the provinces. There are now several branch apiaries, varying in size from five to over one hundred colonies. Not all of these apiaries are used for experimental purposes, the smaller ones, consisting of only a few colonies, are for the purpose of demonstrating modern equipment and modern methods of keeping bees based on the results obtained in the larger experimental apiaries.

The Division through this chain of apiaries conducts experimental and research work in queen breeding, swarm control, wintering, colony manipulation and many other phases of practical beekeeping. It is also carrying out extensive projects related to the fermentation, granulation and storage of honey. In addition, certain studies are being made of nectar and pollen secreting plants, and also of the pollens found in honey. It also examines samples of dead brood and bees for disease, analyses samples of honey, and in many other ways endeavours to assist the beekeeper and to improve the beekeeping industry of Canada.

Breeding.—Queen breeding is being conducted chiefly at the Experimental Station, Kapuskasing, Ont., in an endeavour to improve the strain of bees kept by increasing vitality and reducing the swarming instinct.

Swarm Control.—Swarming and honey production are not compatible, therefore, studies are being made of the factors that appear to influence this habit of bees. In spite of preventive measures, however, certain strains of bees are determined to satisfy the swarming instinct in the natural way. To meet such cases, three satisfactory methods of swarm control have been developed and tested. Two of these methods are now used extensively by commercial beekeepers.

Wintering.—This is one of the greatest problems of Canadian beekeeping. The season during which bees are able to gather supplies is comparatively short, while the winters are long and severe. The average life of the bee during the summer months is approximately six weeks, but in winter their life must be prolonged to at least eight months. To do this requires a careful study of colony strength, food supply and protection in relation to wintering. The Experimental Farm apiaries have shown that bees can be safely wintered outside in packing cases anywhere in Canada, provided the colonies are properly prepared the previous autumn.

Colony Management.—In a country so large as Canada one expects to find a great variation in climatic conditions and flora, so that a system of management suited to one region may be entirely unsuitable for another. These variations are being studied and the Branch Farm apiaries are engaged in developing systems of management best suited for the regions they serve.

Honey.—Due to the enormous increase in honey production, Canadian honey is now being exported to other countries and because of this, honey has to be held in storage for longer periods of time. As honey is a perishable product the question of storage has raised

a new problem necessitating extensive studies of its keeping qualities.

Other Work.—Other projects dealing with imported package bees for honey production, orchard pollenization, etc., are being conducted, also work on several phases of apiary management, the testing of hives of various makes, different types of winter cases, honey pollens, etc., is being carried. Extensive experiments for the sterilization of combs infected with American foulbrood, conducted at the Experimental Farm, Brandon, Man., have failed to confirm the claims made for the various chemical treatments advocated.

Bee diseases are diagnosed free of charge. Samples of infected brood sent to the Division at Ottawa are microscopically examined, the nature of the infection determined and the beekeeper is then advised as to the best means of eradicating the infection.

Apiary Reminders are issued seasonally to beekeepers on request. Their value lies in discussing briefly matters which will shortly demand attention.

The Bee Division gives assistance to the extension work of various Provincial Departments, and by diagnosing samples of dead brood sent in by provincial inspectors. It also co-operates with other federal Services in several experimental projects.

Cereals.—While the Cereal Division as such assumed its present form about 1904, there has been a continuity of cereal breeding work since the inauguration of the Farms.

The chief function of the Cereal Division is to obtain for use in all parts of Canada the most profitable varieties of cereal grains, peas, field beans, flax and buckwheat.

The accomplishment of the above task is sought in the following main ways, namely:—

- (1) The isolation or creation of superior new varieties or strains of cereal grains, as well as of such crops as peas, beans, and flax.
- (2) The testing of new promising varieties or strains of the above crops produced in Canada or introduced from other countries in order that their adaptability for Canadian conditions may be determined.
- (3) The production of what is known as "foundation seed" of new promising varieties produced at Ottawa.
- (4) The production of Elite Stock seed of registered varieties of the above crops for propagation on a larger scale by the various Branch Experimental Farms or by members of the Canadian Seed Growers' Association.
- (5) Assisting in the work of verifying the genuineness and purity of seed stocks submitted for the purpose by the Canadian Seed Growers' Association.
- (6) The investigation of varieties of grain for which a licence has been applied, in accordance with the requirements of the Canada Seeds Act.
- (7) The investigation of new promising varieties submitted by private plant breeders, farmers, seedsmen or others.
- (8) The identification of varieties submitted by farmers or others for that purpose.

- (9) The classification and description of cereal varieties in order that these may be more easily distinguished from each other.
- (10) The encouragement of the use of good seed and good farming practices, by means of exhibits, press articles and public addresses.
- (11) The investigation of various problems having a bearing on cereal breeding and development work such as:
 - (a) The mode of inheritance of certain characters or qualities which are involved in the production of improved varieties.
 - (b) The response to environment of different varieties of wheat in respect of milling and baking qualities.
 - (c) The effect upon the boiling qualities of different varieties of field peas when grown under different soil and climatic conditions.
 - (d) The character of Canadian wheat imported into Great Britain and to the Continent, as regards varietal composition and baking quality.
 - (e) Methods of field technique designed to ensure the most reliable data.
 - (f) The malting qualities of different varieties of barley.

The creation of new varieties is accomplished principally on the Central Farm at Ottawa, and for disease-resistant strains of wheat and oats at the Rust Research Laboratory at Winnipeg. The Division is well equipped for this work and for the subsequent testing and evaluation of various varieties. An experimental mill and baking laboratory at Ottawa enables tests to be made of wheat on a pilot plant basis to the end point of bread production. Through the employment of artificial light in greenhouses, which enables two generations of crosses to be grown in one year, the time required in producing important new varieties is shortened.

At practically all Branch Farms in the system an intensive program of selection from hybrid populations, supplied chiefly from Ottawa, is in progress. This is an integral and indispensable feature of cereal breeding in Canada, whereby the adaptation of various new or introduced varieties to different regions is determined. In recent years the policy has been adopted of assigning certain cereal crops or problems to individual Branch Farms for intensive study on selection and breeding. A case in point is the successful development at Swift Current of wheat strains exhibiting a "solid stem" characteristic which materially reduces the incidence of troublesome saw-fly attack. The main function of the Branch Farms, however, is to determine the regional adaptation of varieties, both on the Farm premises and as much as possible at outlying points such as Illustration Stations and co-operating farms.

Through this program it is possible to define varietal adaptations with great accuracy.

Experimental Farms as Seed Centres.—In addition to carrying on work in producing and proving superior sorts for different regions, the policy has been adopted of making each Branch Farm a seed-producing centre, as far as possible.

At some of the Stations special seed-cleaning machinery designed to clean seed rapidly and thoroughly has been installed and such Stations offer their services to farmers who wish to have their seed cleaned and graded. This service is performed at cost, which amounts to only a few cents per bushel. It is desired that every Branch Farm become the nucleus of a seed-producing centre composed of several farmers in the surrounding district who will produce Registered seed, have it cleaned at the Station cleaning-plants and made available for sale to the general public. The value to the country of these sources of supply of guaranteed seed of approved varieties of high vitality and free from weed seeds can hardly be estimated.

Probably the most important work at present under way by the Cereal Division is that being carried on at the Rust Research Laboratory at Winnipeg, where the work of producing new rust-resisting varieties of wheat is largely concentrated.

Co-operation.—In keeping with the widespread applications of cereal work, the Cereal Division engages in many co-operative projects. These include a study of the agronomic and quality characteristics of improved wheat varieties in co-operation with the Dominion Grain Research Laboratory and the Universities of Saskatchewan and Alberta; the testing of winter wheat in co-operation with the Ontario Agricultural College; co-operation on the National Barley Committee with Macdonald College, the Ontario Agricultural College, the Universities of Manitoba, Saskatchewan and Alberta, and the Dominion Grain Research Laboratory; and co-operation on other Dominion-Provincial Committees for studies in durum wheat, soft white spring wheat and flax. Work is also done by the Division on the introduction and licensing of new varieties in co-operation with provincial seed boards or similar co-ordinating agencies, which exist in provinces except the Maritime Provinces.

Among Dominion agencies co-operation is maintained with the Canadian Seed Growers' Association on the standardization of elite and registered seed stocks; with the Board of Grain Commissioners on the varietal identification of commercial samples of wheat, flax and barley; with the Department of Health and Welfare on the vitamin content of flour; and on various technical matters with other Services of the Department of Agriculture.

Flax Fibre

The outbreak of the European war in 1914 was mainly responsible for the establishment of a Fibre Division of the Experimental Farms Service. Belgium and Northern France, both producers of large quantities of flax fibre, were at that time under German army occupation, and as there was a great demand in Allied countries for linen and fibre for war purposes, new sources of supply became imperative. In order to increase the acreage under fibre flax in Canada, then about 4,000 acres, the Fibre Division was organized in 1915. As a result of the experimental and promotional work of this Division, the areas in Canada suitable for fibre flax production were determined, mostly in Ontario and Quebec, and the acreage under this crop was increased to some 35,000 acres.

During the depression of the 1930s the production of fibre flax in Canada fell to as low as 5,000 acres, largely because of lack of demand in Great Britain. This

adverse condition was somewhat relieved by the development of pedigree flax seed trade with Ireland, and the widening of the market for flax straw as upholsterer's tow. The Fibre Division served as the Government agency for the promotion of these measures.

Since the outbreak of World War II there has been a sharp increase in fibre flax production in Canada, accompanied by the establishment of flax mills at various points, which has widened the Division's field of activity.

The function of the Fibre Division is to promote the growing of fibre plants in Canada. While this work has been largely confined to investigations in connection with the growing of flax and preparing the fibre and seed for market, experiments have been conducted with various types of fibre plants in order to determine their suitability for Canadian conditions. In this work the Division operates a model flax mill at Ottawa, with adequate laboratory facilities, conducts growing and harvesting tests on various Branch Farms, and has recently opened a Flax Fibre Pilot Mill at Portage la Prairie, Man., for investigations applicable to prairie conditions.

In connection with the promotion of fibre flax production in Canada, the Division serves in an advisory capacity as regards the organization and erection of new mills and in subsequent production and processing operations.

Cooperative efforts of the Fibre Division cover variety tests with Macdonald College, variety and retting experiments with the University of Manitoba, and variety and fertilizer trials with the Provincial Flax School of Quebec at Plessisville, Que.

Field Husbandry

The Field Husbandry Division was organized about 1912 to conduct the experimental work on field crop production and related subjects which had formerly been the partial responsibility of the Agriculturist.

To secure reliable information on the most profitable methods of field crop production under various climatic, soil and marketing conditions, the Field Husbandry Division conducts extensive investigations into cropping, cultural, fertilizing, pasture and range studies, and farm management practices on the different Dominion Experimental Farms throughout Canada. Through the results of these investigations farmers are able to learn what practices are likely to prove most profitable on their farms, as well as those which should be avoided.

Drought and Soil Drifting in Western Canada.—In connection with the important problems of drought and soil drifting in the Prairie Provinces, a considerable amount of experimental work is in progress on Branch Farms, District Experiment Sub-stations and Reclamation Projects.

Manures and Fertilizers.—Soil fertility in the more humid regions of Canada can be satisfactorily maintained by the judicious use of farmyard manure. When adequate supplies of manure are not available, however, the use of commercial fertilizers may prove advisable.

Weed Eradication.—The loss to Canadian farmers which may be credited to weeds is impossible to estimate, but must amount annually to approximately 70 millions of dollars. To learn the most effective and least expensive methods of weed eradication, many experiments are in progress.

Harvesting Experiments.—Proper harvesting methods are essential in ensuring good quality farm crops. Extensive experiments have been carried on over a long period of years to determine the best and most economical methods of harvesting and storing hay crops and of harvesting grain and silage crops with different types of machinery.

Farm Machinery.—The Field Husbandry Division is conducting experiments with different types of tillage implements, seeding, spraying, fertilizing, harvesting, and drainage machinery in order to learn their relative efficiency, as well as the essential machinery requirements of various types of farming.

The relative cost and suitability of tractor and horse-drawn equipment for various farm enterprises have received considerable attention. In recent years the use of rubber tires on wheel-type tractors has resulted in an appreciable reduction in operating costs, sufficient to make the use of these tires an economical practice.

Drainage and Irrigation.—The installation of various drainage systems on many Dominion Experimental Farms has afforded some opportunity for determining the cost and value of tile drains in improving crop yields under different soil conditions.

Soil Survey.—The Field Husbandry Division is the headquarters for Dominion activities in soil survey work and provides map draughting and editorial services for Dominion survey parties, and for those Provincial parties who require such service.

Soil Moisture Investigations.—Profitable crop production on the Canadian Prairies depends to a very considerable extent on the economical utilization of the limited supply of moisture. The Field Husbandry Division has conducted for many years a series of experiments on the Experimental Station, Swift Current, Sask., to determine the fundamental relationship between soil moisture and crop growth.

Soil Erosion Studies.—To determine the losses in soil fertility caused by water erosion, as well as methods for its control, experiments are in progress on several Branch Farms. On the Central Experimental Farm at Ottawa the Field Husbandry Division has installed extensive apparatus to determine accurately loss of soil by erosion on sloping land under different cropping and tillage systems.

Cost of Production Studies.—Through data secured from field experiments conducted throughout many years the division has collected considerable information on the cost of producing various crops.

Meteorological Records.—Careful records are secured on all the Dominion Experimental Farms of temperature, rainfall, sunshine, and other meteorological conditions.

Co-operative Projects.—The Field Husbandry Division co-operates extensively with all provinces in soil survey matters; with the University of Alberta in prairie soil fertility research; with the Ontario Agricultural College in pasture improvement and potato production studies, and with the Nova Scotia Department of Agriculture on basic slag investigations. The Division is represented on various national and provincial committees, and renders various services to other Federal Departments, including agricultural development work

in the Yukon and Northwest Territories for the Department of Mines and Resources; advice on the management of penitentiary farms for the Department of Justice; on land settlement for the Veterans' Land Act administration; and on the collection and compilation of meteorological records for the Department of Transport. Inter-divisional and inter-service projects are also maintained.

Forage Plants

The activities of the Division of Forage Plants, which was established as a separate unit in 1912, consist of the testing of grasses, leguminous crops and hoed crops to determine their productivity and suitability for use in Canada; the selection and breeding of grasses, legumes, corn, field roots and sunflowers; the study of hay and pasture problems; the production of seed and its distribution; special research work such as plant introduction, plant nutrition and cytology.

Variety Tests.—Extensive tests are carried on to determine the varieties of grasses, clovers, alfalfa, corn, soybeans, sunflowers, field roots and other forage plants that are best suited to the different agricultural zones of Canada.

Breeding and Selection.—An extensive program of grass breeding has as its object the production of improved strains for hay, pasture, and turf purposes.

Hay and Pastures.—Special attention is being given to hay and pasture problems. Pasture improvement constitutes one of the major problems in Canadian agriculture. Particular attention is directed to the study of pure species and mixtures of grasses and legumes, their productivity, palatability, nutritive value, aggressiveness, persistence under grazing, and reaction to fertilizer treatments. Annual and supplementary pastures are being compared for midsummer use when the permanent pastures are at their lowest level of production.

Seed Production and Distribution.—This phase of work includes the study of seed production methods, the multiplication of new varieties and strains, and the distribution of this seed to farmers through the services provided for the purpose.

Special Research Activities.—New species and varieties of forage crops are continually being introduced from all parts of the world and tested in an introduction nursery, where their promise either for direct use or for use as breeding material is ascertained. Plant nutritional studies are conducted in the greenhouse during the winter months, the plants being grown under controlled conditions, using nutrient solutions. These studies make it possible to determine suitability of certain varieties to particular types of soil, and to associate malnutrition symptoms with the special mineral deficiency under field conditions. In the field of cytology, studies are being made on certain species where fundamental information is required prior to hybridization work.

In addition to the work outlined, the Division has perfected a cheap, quick, accurate system of dry matter determination for the purpose of reporting forage crop yields. Experiments are conducted with turf grasses, and information is made available on the various grasses adapted to the different types of lawns. Educational exhibits are frequently prepared, and farmers are given

assistance on all phases of forage plant work by means of circulars, bulletins, and private correspondence.

During the current war the Division of Forage Plants has been able to assist both the Department of Transport and the Air Force in the establishment and maintenance of turf cover on airports and flying fields throughout the Dominion. This involved the recording of specialists both from the Division at Ottawa and from Branch Farms for supervisory services on airports on a regional basis. In these services the experience gained from investigations in every part of the Dominion has proved most useful.

Co-operative Projects.—The Division operates a Forage Crop Laboratory at Saskatoon, Sask., at the University of Saskatchewan, as a co-operative project of some interest. This project has been in operation since 1931. Through a co-operative agreement the University places certain facilities; officer, laboratory, greenhouse, etc., at the disposal of the Division as well as some 40 acres of land on the University farm for plot work. These facilities are used by the Division to conduct research and plant breeding on all of the principal grasses and legumes which can be grown under prairie conditions, with special reference to disease resistance, increased hardiness and increased seed production of alfalfa, and similar work with other forage crops including brome grass, crested wheat grass and sweet clover. The work so done constitutes for the University the basis of research and teaching in forage crops, the Divisional Officer-in-charge of the laboratory also acting as Professor of Forage Crops in the Field Husbandry Department of the University. The University itself does not do any forage plant breeding work, so that there is no duplication of effort or facilities.

The Division also conducts several research projects in co-operation with Science Service.

Horticulture

Horticulture has represented a distinct branch of experimental work since the inauguration of the Farms system, the first Horticulturist having been appointed in 1887. At this time there was little information available on the adaptability of varieties and kinds of horticultural materials to various parts of Canada. Some of the more favourably located areas, such as the Annapolis valley in Nova Scotia and the Niagara peninsula, had already developed a fairly satisfactory horticulture by the introduction of varieties from other countries, but for other parts of the country many available varieties were unsatisfactory. The early years of work in horticulture were largely spent, therefore, in variety testing and plant improvement through breeding and selection. Main divisions of work at the present time include pomology, vegetable crops, ornamental horticulture, cold storage and fruit and vegetable products. Studies are conducted on plant physiology and nutrition.

Horticultural work is carried on at all Branch Farms but at many it largely consists of variety testing and minor cultural experiments. The main endeavour in horticultural research and experimental work is conducted at the Central Farm at Ottawa, with special projects on the Branch Farms at Kentville, in the Annapolis and Cornwallis valley of Nova Scotia; Fredericton, N.B.; Morden, Man.; Summerland, B.C.; Agassiz, B.C.; Saanichton, B.C.; and for muck soils on the Sub-Station at Ste. Clothilde, Que. The new Sub-

Station at Smithfield, Ont., will be devoted to orchard work.

Pomology.—Apple breeding work has been divided into two main divisions: (a) the origination of varieties suitable for Eastern Ontario and Quebec, and (b) the origination of varieties suitable for the prairies. Breeding is also being conducted with pears, cherries, plums and small fruits.

Rootstocks and Tree Building.—One of the greatest problems facing the fruit industry of Canada to-day is the heavy losses of trees due to bark splitting and crotch injury as a result of frequent severe winters. This division is making a thorough study of the possibility of overcoming much of this by the employment of very hardy rootstocks and hardy frame-works to be top worked to the desired sorts.

Fertilizer and cultural experiments are being conducted at various points in Quebec, Ontario and Nova Scotia on grower-owned orchards.

Vegetables.—The testing, breeding and selection of vegetable varieties to suit the various conditions in the country has been a main effort for many years.

Ornamental Horticulture.—In a comparatively new country like Canada the creation of a satisfactory horticulture has of necessity been of paramount importance. This has involved at all Farms a great deal of variety testing.

Cold Storage.—Low temperature laboratories are operated at Kentville, Ottawa and Summerland. At these centres research in temperatures and varietal relationships, humidities and nutritional effects are being studied. The utilization of controlled atmospheres in connection with the storage of apples and pears has resulted in definite recommendations for commercial application. A fully equipped respiration laboratory, is operated in conjunction with this work.

Fruit and Vegetable Products.—Laboratories dealing with this phase of work are operated at Kentville, Nova Scotia; Ottawa, Ontario; and Summerland, British Columbia. The Kentville laboratory has developed equipment and a method for the dehydration of fruits and vegetables which is now used by a number of large commercial plants in Canada, producing high quality products at reduced cost.

The Ottawa laboratory has interested itself in research work and the commercial application of freezing to the preservation of strawberries, raspberries, peas, green beans, corn on the cob, asparagus, spinach and other crops. This laboratory has also perfected a satisfactory and simple method of fruit juice preservation enabling the bottling and holding of cider and other fruit juices for prolonged periods without change.

The Summerland laboratory has developed a method for the processing of sweet cherries as a glazed stock and maraschino stock which has been given extended commercial application, in addition to a considerable effort in dehydration and fruit juice work.

Plant Nutrition.—Plant nutrition studies with various horticultural crop plants have been conducted and visual symptoms depicting various forms of malnutrition have been detected and illustrated.

The growing of certain crops in sand cultures in the greenhouse has been studied and given commercial application to carnations, lettuce and chrysanthemums.

In 1943, at the request of the Department of National Defence, a vegetable production project was undertaken at an Army and Air Force establishment in Labrador. Owing to the absence of ordinary soil, crops were grown by soilless culture methods. The practicality of using such methods in isolated areas devoid of suitable soil was demonstrated.

Other Features.—At Summerland, British Columbia, valuable work in irrigation practices has revealed definite recommendations for the irrigation of such crops as melons and tomatoes. Investigations into the cause of tomato breakdown are in progress at this station. At Agassiz, British Columbia, extensive work to determine the cause of raspberry decline in the Fraser river valley is being undertaken.

At Fredericton, New Brunswick, a very comprehensive potato breeding program is conducted where breeding for disease resistance is the keynote. A large number of hybrid varieties showing considerable resistance to such troubles as mild mosaic and late blight are being tested for their horticultural desirability.

Co-operative Projects.—The Division of Horticulture co-operates with the Quebec Department of Agriculture in orchard investigations; with the Canadian Seed Growers' Association and several provincial institutions in the origination and maintenance of satisfactory foundation stocks of vegetable seeds for seed production; with the Ontario Agricultural College on orchard nutritional studies; and with the Division of Botany, Science Service, in strawberry breeding for disease resistance.

Illustration Stations

The object of the Division of Illustration Stations is to serve as a connecting link between the Experimental Farm and the man on the land. These stations are operated on privately owned farms on the basis of a co-operative agreement entered into with the owner and the Dominion Experimental Farms Service. The division was established in 1915, and work undertaken at 29 points within the provinces of Alberta and Saskatchewan. By 1925 the stations numbered 142, and extended to each of the nine provinces. In 1935, after a second decade, there were 223 stations. During that year drought and soil drift problems of the prairies assumed major proportions which required a concerted and aggressive program of direct attack. As a result, the Illustration Stations on the plains area of the West were reorganized and enlarged into what are now named District Experiment Sub-Stations, operating under the Prairie Farm Rehabilitation Act. Upon these stations later, strip farming and associate cultural practices, tree planting, water impounding projects and forage crop production became active principles in carrying on the program of work. The present organization of the division comprises 157 Illustration Stations and 51 district Experiment Sub-Stations.

Since the inception of the division, the scope of its work has broadened as necessity required, thus it has progressed from its original purpose of disseminating the results of experimental data by field and cultural demonstrations, to include outpost crop testing and experiments of a fact-finding nature. Farm problems are studied in their local environment, associated with the more comprehensive research work being carried on at the Experimental Farms. Thus the results of such work are quickly brought to the communities concerned.

Field Days and Co-operative Efforts.—A consistent effort has been made to increase the usefulness and service which the Illustration Stations may render in the various communities served. In this connection it is essential that crops grown, methods adopted and results of fact-finding projects pertaining to local problems be brought to the attention of neighbouring farmers. Field days are held on the stations, and where possible organized in co-operation with the local agricultural society or representative. At these meetings details relative to the production of different crops, varieties of grains and grasses grown, preparation of the soil, rates of seeding, etc., are discussed.

Co-operative Projects.—Field officers of the Division of Illustration Stations maintain close co-operation with the various provincial extension services, who make full use of the demonstrational results on the stations. In addition the Division conducts experiments on the management of farm woodlots on eight Illustration Stations in the Maritimes, this in co-operation with Lands, Parks and Forests Branch of the Dominion Department of Mines and Resources. Several technical projects are conducted in co-operation with other Services of the Department of Agriculture. Within the Experimental Farms Service there is full co-operation with all Divisions.

Poultry

Work with poultry has been conducted by the Experimental Farms since their inauguration, the first Poultry Husbandman being appointed in 1888.

The work of the Poultry Division embraces fundamental research and experimental work in the various branches of poultry husbandry, including breeding, incubation, brooding, rearing, nutrition, disease and preparation of poultry products for market, both at the Central Farm and upon the various branch farms. In co-operation with the Health of Animals Branch, work upon poultry disease control is undertaken, with a laboratory in charge of a qualified veterinarian.

Breeding.—By trapnesting, pedigree breeding, progeny testing and individual and family selection, flocks of high quality poultry of the popular breeds have been built up at Ottawa, and upon the Branch Farms. Particular attention has been given to standard qualities as well as to egg production and egg size, with the result that high producing stock of good type has become the basis for all breeding work. Breeding stock of this quality is yearly distributed among the farmers and poultry keepers of Canada from the different farms, and Illustration Stations at reasonable prices, thus gradually improving the quality of poultry upon Canadian farms.

Incubation Brooding and Rearing.—Considerable experimental work is carried on in testing out types of incubators and determining the conditions of temperature, moisture and ventilation, best suited to incubation in different localities. Owing to the great variation in conditions in different sections of Canada, it has been found necessary to vary the methods of operation according to locality and in testing out practices the Branch Farms lend themselves admirably to this work.

Nutrition.—Nutrition is a major consideration. The feeding of chicks through all the various stages of developing in preparation for marketing receives the most careful consideration, and study and research is conducted to discover all the ingredients necessary to

make up the most satisfactory rations. Feeding trials have shown the absolute necessity for the inclusion of certain vitamins and minerals in the rations and research is constantly being carried on to discover how these may be best and most economically supplied. Balanced rations are compounded and recommended to those seeking information.

Housing.—The varied climatic conditions found throughout Canada demand poultry houses adaptable to as many conditions as possible with distinct types satisfactory for average Canadian conditions. Slight alterations in plans and equipment to suit local conditions together with numerous innovations as time and experiment dictate, have been responsible for the placing of this work upon a satisfactory basis.

Economics.—Both at the Central Farm and upon the Branch Farms accurate cost account figures are kept upon all poultry operations, with the result that figures are available for incubation, brooding, rearing, egg production and fattening costs under the varied conditions met with upon the different parts of the system.

Problems of marketing of eggs and stock of all kinds are given due consideration, particularly in so far as preparation for market is concerned.

Disease.—A well-equipped pathological laboratory in charge of a staff of qualified veterinarians is responsible for the carrying on of experiments in the control and eradication of poultry diseases. Pullorum disease, intestinal parasitism and diseases of egg production are given special attention and methods of control and eradication of these troubles are recommended.

General.—New methods and equipment are constantly being tested, including batteries for brooding, rearing and laying, and rations suitable for battery use have been compounded.

Results of experimental work along the above mentioned lines, including recommendations made, are embodied in the annual reports of the division and of each Branch Farm. Booklets and circulars are also available upon each of the subjects dealt with above. A large amount of correspondence is also handled and is an efficient medium for the discussion of the poultryman's problems.

Tobacco

The primary aim of the division is to make tobacco growing in Canada a remunerative farm enterprise. Special attention is being given to such production problems as breeding for new varieties; testing and introducing promising strains from other countries; soils and fertilizers; cultural methods; harvesting, curing, and warehousing; control of diseases and insects; rotations, crop effects, and cover crops. The four Experimental Stations associated with the Tobacco Division in this program are strategically located in the principal commercial tobacco-growing areas of the Dominion; Harrow and Delhi in Ontario, L'Assomption in Quebec, and Summerland in British Columbia.

The industry has expanded and changed considerably since the Tobacco Division was formed in 1906. Thirty-five years ago production was practically restricted to Burley in Ontario, and to the small and large pipe tobaccos and cigar leaf in Quebec. The greatest progressive change has occurred during the past

ten to twenty years, with consumer taste shifting from cigar and pipe smoking to cigarettes. This has entirely transformed the requirements of production. In 1944 nearly 85 per cent of the crop was of the bright flue-cured cigarette type. The division supplies reliable information for producing a crop that will fulfil manufacturers' requirements as well as satisfy consumer tastes. This has involved the introduction of new varieties, and improved technique in growing, harvesting, and curing the crop.

Although a creation of new varieties by hybridization and selection is usually a slow process the Division has developed a Burley variety known as "Harrow Velvet" which now is grown extensively in Western Ontario. In addition to producing a thin, bright leaf, Harrow Velvet is highly resistant to black root-rot. Another new resistant burley, "Haronova", more recently has interested several growers. In originating better varieties for special conditions, earliness of maturity, resistance to mosaic, and improvement of aroma are characters considered. The improvement of existing varieties by selection is also receiving attention.

Field tests are conducted to ascertain comparative merits of varieties, and to maintain types desired and approved by the tobacco trade. Several varieties new to Canada have been introduced in the past decade.

Specific soil types from the various tobacco growing districts have been analyzed and classified, and on the basis of this work advice is given to prospective growers. The residual effects of fertilizers in various soils are measured. The application of rapid soil tests in the diagnosis of fertilizer needs on individual tobacco fields is gradually becoming practicable, especially when interpreted in the light of previous crop performance. Mineral deficiencies in soils have been studied, also methods of soil conservation, including the planting of windbreaks and the maintenance of soil organic matter by rotations and cover crops. Among the particular problems which have received attention are the potash fixing power of various tobacco soil types, and the magnesium requirements of Ontario flue-cured soils.

In co-operation with the Division of Botany, Science Service, extensive research has been in progress with special consideration given to black and brown root-rots, mosaic, and leaf spots. As a result of these investigations diseases in tobacco plant beds and greenhouses have been greatly reduced by soil sterilization and the use of fungicides.

General field days are held each year at the Stations located in the chief tobacco-growing areas. These provide a channel for the dissemination of practical information resulting from experimental work, and have proved very popular with the growers. Fertilizer and variety demonstration plots located on various farms serve a similar purpose. Definite fertilizer recommendations based on experimental results are prepared at a special Fertilizer Conference, and made available to growers and fertilizer companies each year.

Contact is maintained with the growers by means of correspondence, special winter meetings, and personal interviews at the stations and on the growers' farms. Timely circulars and press articles keep the tobacco producers informed on the most recent improved methods. Reports are published by the Tobacco Division at Ottawa, and by the various Stations. Special bulletins dealing with the industry are published and revised from time to time.

The Quarterly publication "The Lighter", issued by the Dominion Tobacco Service, contains information and statistics on the tobacco industry. Close co-operation is maintained with the marketing association, and also with the Department of Trade and Commerce regarding export possibilities and the requirements of special markets. Assistance is also given through the medium of the tobacco section in the "Agricultural Situation and Outlook" reports.

Miscellaneous Activities

Certain lines of Experimental Farm work do not come under the supervision of any Division. Chief among these are the operation of the two Forest Nursery Stations in the Prairie Provinces, the Experimental Fox Ranch at Summerside, P.E.I., the Cultural Phases of the Prairie Farm Rehabilitation program¹, and the recently instituted program of Dykeland Reclamation on the Bay of Fundy. These activities are supervised by the Director.

Dominion Forest Nursery Stations, Prairie Provinces.—The promotion of tree-planting on farms in the Prairie Provinces was originally the responsibility of the farmers Dominion Department of the Interior. This Department established a Forest Nursery Station at Indian Head, Sask., in 1903 and another at Sutherland, near Saskatoon, Sask., in 1912, for the purpose of promoting tree-planting on the prairies, through the provision to farmers of free or nominally-priced trees and seedlings together with personal advisory services. With the transfer by the Dominion to the Provinces of the natural resources of the Prairie Provinces in 1931, the Department of the Interior was dissolved by reason of the lapse of most of its function, the few surviving services being apportioned to other federal Departments. Under these conditions the Forest Nursery Stations at Indian Head and Sutherland were transferred to the Experimental Farms Service. Further reference to these Stations is made below under Prairie Farm Rehabilitation Act.

Experimental Fox Ranch, Summerside, P.E.I.—In response to requests from the farming industry that the Dominion Government undertake scientific investigations of fox breeding and related problems, the Experimental Fox Ranch at Summerside, P.E.I., was established by the Farms Service in 1925. At this Station are conducted various researches into the production of high-class furs, nutrition experiments, breeding and genetical studies. Eight Fox Illustration Stations are operated by the Fox Ranch at various points in the Maritime Provinces.

Dykeland Reclamation.—In 1943 the Dominion Government authorized limited contributions to the reclamation of dyke agricultural lands in the Provinces of Nova Scotia and New Brunswick, on the shores of the Bay of Fundy. Many of the dykes and water control works necessary to prevent tidal flooding for these lands, constructed many years ago, have fallen into disrepair, to a considerable extent by reason of adverse economic conditions. In this limited rehabilitation program now in progress, the Experimental Farms Service administers the Dominion share of contributions and provides the services of engineers and surveyors as well as the supervisory services of specialists in dykeland farming.

One main objective of this Experimental Farm Service is to determine the best and most economical measures for dykeland reclamation.

5. ACTIVITIES RELATING TO PRODUCTION

PROVINCIAL ACTIVITIES

In all of the provinces the Departments of Agriculture have distributed the responsibility for rendering services to their farmers among several branches or divisions. The field crop, live stock, dairy, poultry, and horticultural branches or services are common to all provinces.

In most provinces these basic services have been supplemented by additional activities. For example, many provinces have set up veterinary, plant and animal, pathological and rural engineering services to assist farm organizations and societies. Services are designed to promote and assist in the development of special crops or classes of live stock. Another activity concerns itself with agricultural education and extension work, including both the teaching of young people and the application of accumulated knowledge of agriculture for the benefit of those associated with the land. Other activities include assistance to new settlers in time of distress, by providing relief, as well as aiding established farmers.

Land Settlement

Services in relation to land settlement vary considerably. In some provinces even where lands are still available for homesteading, comparatively little actual assistance or encouragement of settlement is provided. However, in at least one province intensive efforts at colonization are being made and agricultural assistance in a variety of forms is being provided "new settlers". In the newer areas where colonization or settlement is in progress activities range all the way from financial aid and advisory services to the erection of buildings and clearing the land.

Field Crops

Most of the provinces have a specialized branch or division responsible for field crops. It may include a crop production service, which by means of special government appropriations makes registered and certified seed of different kinds available to farmers at special prices. Special facilities for the cleaning of seed may be made available to farmers. Seed production programs are promoted and the use of pure seed encouraged. Under a policy of crop protection, campaigns are conducted to promote the control of injurious insects such as grasshoppers and cutworms. Weed control and identification is an important activity of this service. A soils and fertilizer service may exist to assist farmers to study their soils and understand the correct type of fertilizer, and means of application. Financial assistance may be provided for the quarrying and distribution of limestone. Soil conservation services are also made available and the best cultural practices encouraged. Seed fairs, standing crop competitions and other such activities are also promoted in an endeavour to improve crop production. One of the provinces assists farmers in obtaining tractors.

Live Stock

The provinces have adopted a number of policies to facilitate the improvement of live stock and increase

¹ These activities are described on page 76.

the production of live stock products. Assistance in the provision of highly qualified sires is quite general in all provinces. The breeding and distribution of pure bred live stock is promoted and encouraged through exhibitions, reduced transport costs and other means. Financial assistance to live stock sales may be provided. Boys' and girls' live stock clubs are sponsored and supported. The live stock services carry on a continuous fight against disease. Feed trials and nutrition experiments are furthered. Feeder associations are financed. Live stock field days are encouraged as a means of fostering the recognition of high quality live stock. By these and other means the farmer's attention is directed to the selection and use of improved farm animals.

Dairy

The main services performed by the provincial dairy branches are the inspection of dairy manufacturing plants and the instruction of the operators of these plants, aiming to improve the quality of manufactured dairy products. Short courses are commonly conducted to instruct cheese and butter makers in the latest details relative to their professional activity. The branch sponsors cow-testing by means of Dairy Herd Improvement Associations.

Poultry

The poultry branches encourage improved breeding, feeding and housing of poultry. One of their important activities is the selection and banding of breeding birds used in flocks supplying eggs to hatcheries. A concerted effort is put forth in the prevention and control of disease. Field services are commonly established whereby farm flocks may be culled, disease diagnosed, sanitation corrected and suggestions made for the improvement of poultry buildings.

Horticulture

In those provinces where tree or bush fruits are grown commercially, attention is given to the promotion of suitable varieties, to plantation care, to the use of sprays and fertilizers, and to the best methods of picking, packing and marketing the products. Entomologists and plant pathologists work in close co-operation with these branches. In some cases, apiculture is closely associated with horticultural branches. In all provinces service in connection with bees is provided in some form. Encouragement is given to farm, home, school and community centre planning and beautification through floral and landscape activity.

Agricultural Societies and Women's Institutes.—The encouragement of improved production through the medium of agricultural society activities—the first of the "service" activities by governments on behalf of farmers—is still an important function of provincial governments. This activity generally centres in the Department of Agriculture, though exceptions are found. In some instances the work is conducted by a special division; in others it is closely related to, or is a part of the extension service.

The activities in this field are numerous but the more important are represented in crop competitions, plowing matches, short courses, junior club work, farm improvement and agricultural exhibitions. In these the Department provides supervision and encouragement—and frequently financial assistance—while local activities are under the direct sponsorship of numerous local societies.

In the field of Women's Institutes the provinces also accept responsibility. In some of the provinces this work is conducted by a special division of the Department of Agriculture through local Women's Institutes. In other provinces the work is a part of extension activities. In this field of activity Canadian farm women have pioneered—the Institute movement being acknowledged as the first of its kind.

The home economists and demonstrators in this field are responsible for a varied program including instruction in gardening and home beautification, in home canning, cooking and nutrition generally, in the making of clothing, in domestic arts, in health and other activities connected with the farm home. An important part of the program conducted by these officers is with the young people on the farms.

DOMINION ACTIVITIES

The following Divisions comprise the Production Service as now established: the Health of Animals Division, the Live Stock and Poultry Division, and the Plant Products Division. Under normal peace-time conditions, it is the responsibility of the Production Service to give national leadership in organizing agricultural production. Through it, the work of the Dominion and Provincial field staffs is co-ordinated in interpreting to farmers ways to profitable production derived from activities of the Experimental Farms and Science Services and from the intimate association of the Marketing Service with agricultural commerce. It is responsible for the administration of acts designed to prevent the introduction and spread of diseases of animals and to ensure freedom from disease in animals exported, and of acts standardizing the sale in the domestic market of meat and canned foods, seed, feeding stuffs, fertilizers, agricultural products, agricultural poisons, hay, straw and binder twine.

During the war period, the necessity of greatly expanding the production of many agricultural products and of giving all possible guidance to Provincial Departments and farmers' organizations in the development of wartime food programs has resulted in many of the normal functions of the Production Service in this field being discharged by the Agricultural Supplies Board, the membership of which consists of the Deputy Minister, the Assistant Deputy Minister, the General Executive Assistant and the Directors of the four Services. During this period the Production Service has, however, remained undisturbed in its normal administrative responsibilities, and through its field staff, particularly in the Live Stock and Poultry and in the Plant Products Divisions, has worked in close co-operation with the staffs of the several Provincial Departments in the organizing of production programs.

As is indicated in the outlines of the activities of the Live Stock and Poultry and of the Plant Products Divisions, much of the work of the field staffs of these two Divisions is carried on under policies jointly supported by Dominion and Provincial Departments. Field services and assistance policies financed solely by the Dominion are for the most part national in scope. In the development of joint programs, the linking of the specialized knowledge and markets information possessed by the limited Dominion field staff in a province with the knowledge of local personnel and of conditions possessed by the Provincial fieldmen, makes possible effect-

tive team-work in giving leadership to producers. Lacking such direct and continuous contact with field work in the several provinces, it would be difficult for the headquarters staffs of these Divisions to contribute constructively to agricultural production developments of national significance.

Health of Animals

The Health of Animals Division is responsible for the administration of the Animal Contagious Diseases Act and of the Meat and Canned Foods Act, both of which apply in a field distinctly Federal in scope. Under these two Acts the movement, into and out of Canada and interprovincially, of live stock and of meat and canned foods is controlled.

Under the Animal Contagious Diseases Act regulations have been established, designed to prevent the introduction of animal plagues and other reportable diseases into Canada, and to control and eradicate such diseases within the Dominion should outbreaks occur. Exports of live stock from Canada are also strictly supervised to meet animal health requirements of importing countries.

Under the Meat and Canned Foods Act, the slaughter of all live stock and the preparation of meat and meat food products in establishments engaged in export or interprovincial trade is supervised in respect to animal health and sanitary requirements. Regulations governing the importation from foreign countries of meat and meat food products are also enforced.

Programs having as their objective the eradication of non-reportable diseases such as bovine tuberculosis and Bang's disease are developed under optional policies. The plan relating to the control of bovine tuberculosis in specified areas is one which becomes operative only after a Provincial Department of Agriculture has requested the Dominion Government to establish a defined part of the province as a restricted area for the eradication of the disease.

All cattle within an area which has been gazetted must be submitted to the tuberculin test, and reactors slaughtered under supervision. When an area is established by Federal authority in response to such request, the Provincial Government concerned co-operates in the enforcement of the restricted area regulation, and also pays for the transportation of Dominion veterinary officers during the conduct of the general tests and the first 60-day retest.

While the prevention or control of animal disease is of vital importance to live stock producers, it is equally important to consumers. The benefit to human health in the protection of the milk supply provided through progress made in the eradication of bovine tuberculosis and of Bang's disease is obvious.

Live Stock and Poultry

The Live Stock and Poultry Division administers the Live Stock Pedigree Act and the Hatchery Approval section of the Live Stock and Live Stock Products Act; maintains the R.O.P. Service for Dairy Cattle and for Poultry and the Advanced Registry Service for Swine; promotes the work of Advanced Registry Boards for Dairy Cattle and for Swine; administers sire assistance policies in relation to horses, cattle, sheep and swine; supports, under joint policies, boys' and girls' club work in all provinces; administers assistance to fairs and exhibitions, and directs the co-ordination of Dominion

and Provincial departmental effort to improve quality and increase returns in live stock production.

It is from the Live Stock Pedigree Act that breed associations and the Live Stock Records Board obtain their authority in all matters relating to the registration of pure bred live stock in Canada. All Canadian breed associations, with the exception of one, jointly support the National Live Stock Records as a central clearing-house for the registration of pure bred live stock. While the autonomy of the several breed associations in their respective fields is largely preserved, their constitutions and amendments thereto are subject to approval by the Minister of Agriculture. An official of the Live Stock Division approves, for the Minister of Agriculture, all certificates of registration issued by the Canadian National Live Stock Records, and through this Service an annual grant is made by the Department to the Live Stock Records Board.

Regulations established under the Hatchery Approval section of the Live Stock Products Act prescribe the programme known as the Dominion Poultry Improvement Program for the improvement of poultry stock and the eradication of poultry diseases, more particularly pullorum. They prescribe standards and grades for hatching eggs and for chicks, and the requirements with which hatcheries licensed by a Province to operate, and under Dominion permits to ship chicks interprovincially or for export, must comply. They also prescribe requirements relating to the advertising and marketing of hatching eggs and chicks. The regulations are administered on a compulsory basis only in provinces which have requested their proclamation by the Governor in Council. In other provinces, they may be made applicable to any hatchery on a voluntary basis. Only hatcheries which have received a permit under the regulations may ship chicks interprovincially or for export.

The Canadian Record of Performance for Pure Bred Dairy Cattle supplies a service to breeders of pure bred dairy cattle in the supervising of production records and in the issuance of certificates of production for cows which attain the standards prescribed by their respective breed associations. The establishment of production credentials through the Record of Performance has become the keystone of constructive breeding policy for breeders of dairy cattle throughout the Dominion.

The Record of Performance for Poultry forms an integral part of the Dominion Poultry Improvement Program which provides for the establishment of breeding credentials based on high egg production, egg size, meat type and livability. Blood lines developed under R.O.P. supervision are now widely disseminated throughout the Dominion, and have been an important factor in the expanding production of the poultry industry in recent years.

The Advanced Registry for Pure Bred Swine provides for the recording of the production and performance of pure bred sows through testing of their progeny, and involves the recording of all necessary data during feeding and finishing periods, and similar necessary data respecting the carcass. The supervision is provided either at the breeder's premises or in Government-owned pig-testing stations. The utilization of data obtained through this service has become an important factor in the development of constructive breeding program by individual breeders and in the improvement of Canadian bacon for export.

Sire Assistance Policies administered by the Division comprise grants to stallion clubs, stallion premiums, maintenance of horse breeding stations, loaning of pure bred bulls and boars, assistance in the purchasing of boars and rams, and the grading of rams.

The Horse Club Policy, which has been in operation in the three Prairie Provinces since 1915, provides for assistance to horse breeders' clubs organized and conducted in accordance with prescribed regulations. The grant made to a club is based on the number of mares bred during the season and upon the service fee for each mare in foal. This assistance enables farmers in a district to secure at a reduced cost the service of a stallion which has passed Dominion inspection in respect to type and soundness.

In the five eastern provinces and in British Columbia, the Dominion Department joins with the Provincial Department in bearing the cost of stallion inspection and payment of annual grants to the owners of pure bred stallions which pass joint inspection. The amount of the premium paid in each case is based on the number of mares left in foal during the previous breeding season. Through this form of assistance, stallion owners are encouraged to maintain in service better stallions than might otherwise be available in many districts.

At a few points throughout the Dominion the production of horses suitable as saddlers, hunters and of the type required for police and remount purposes is encouraged through subsidies paid to breeding stations organized under prescribed regulations.

At a number of the Experimental Farms, high class stallions of the draft breeds are maintained by the Live Stock Production Service. The service of these stallions is available to breeders in a district under a premium mare policy. A graduated scale of fees applies, free service being allowed in the case of high class or premium mares.

Since 1913, sires have been loaned by the Department under the Bull Loaning Policy to associations of farmers. Initially this assistance was confined to outlying and backward districts, but in recent years much of it has been centred in areas in which other definite cattle improvement projects were in progress. In a number of areas the development of artificial insemination centres has been encouraged through the loaning of high class bulls.

In northern Ontario, northern British Columbia, Alberta and Saskatchewan, assistance is given to groups of farmers in the purchase of pure bred rams through payment by the Department of part of the purchase price. In the three Maritime Provinces, Quebec and Ontario, the Dominion and Provincial Departments share on an equal basis premiums paid on rams purchased under prescribed conditions.

Pure bred bacon-type boars are loaned to junior swine clubs and to groups of farmers who have, under direction purchased groups of sows to rehabilitate their herds and improve the quality of their production. In Saskatchewan, the Dominion and Provincial Departments contribute jointly to the purchase price of boars purchased by municipalities. In Manitoba, the two Departments purchase jointly boars placed by the Province under its boar rental project.

During the fall months, the Division provides a service to pure bred sheep breeders in all provinces of the Dominion in the grading of rams under prescribed standards.

In each of the provinces, the Division co-operates with the Provincial Department of Agriculture in supporting the activities of boys' and girls' live stock clubs. The Province in the majority of cases assumes the responsibility of directing and administering the work, with such assistance and co-operation from fieldmen of the Dominion Department as may seem desirable. In the financing of annual Achievement Day Competitions, the Dominion and the Province share on an equal basis. While the fundamental principles of policies in effect in the several provinces are similar, details in their application may vary as determined by the Province.

Following the outbreak of the war, grants which during the preceding twenty-five years had been annually made by the Department to the more important fairs and exhibitions throughout the Dominion, were discontinued. The extent to which fairs and exhibitions will be assisted financially by the Dominion, and the basis upon which such assistance will be given during the post-war period has not as yet been determined.

Plant Products

The present work of the Plant Products Division developed from a small beginning in 1900, when the Macdonald Seed Grain competitions were organized and monetary inducements provided to encourage the production of improved seed. At the end of three years the successful competitors and others were organized into an Association of Seed Growers, and a system for the inspection and registration of their seed crops was established.

From its early days law administration has been and continues to be the chief function of the Plant Products Division. For some years it administered only seed control legislation, but from time to time various other Acts relating to agriculture were assigned to it for administration by the same inspection staff. As the Division developed, district offices for administrative purposes were established.

In addition to law administration the Plant Products Division has assumed various development and promotional undertakings to raise the quality of the products dealt with by the several Acts mentioned, and particularly the quality of agricultural seeds in general use in Canada. It has also co-operated with Provincial Departments of Agriculture in field and seed competitions and seed and feed distribution and relief programs.

The Seeds Act controls the sale of seed for seeding purposes. Its basis is the grading system. All agricultural and garden seeds are subject to its provisions. Grade names are established for different kinds of seed and must be employed for cereals, forage crops, lawn and turf grass seeds. Only approved varieties of seeds may be sold and distributed for seeding purposes. Provincial Seed Boards have functioned for the past several years in each province, making recommendations regarding grade standards, the classification of weed seeds, and other relative matters. This arrangement enables the administration of the Act to be kept in harmony with provincial needs.

The production of improved seed is promoted by

- (a) Co-operation with the Canadian Seed Growers' Association, a national organization specializing in the production of registered seed. They multiply for commerce the foundation and elite stock seed produced by Dominion and provin-

cial experiment stations and by qualified private growers. The work of the association is maintained by a subsidy from the Dominion Department of Agriculture.

- (b) A system of certification based on standards for crops inspected in the field and for seed after threshing and cleaning.

During the war, with the co-operation of other Dominion and provincial officials, this production system has enabled Canada as a nation to supply to the United Nations a relatively enormous amount of seed of all kinds for food crops. Plans have been based on regional potentialities of production and specific requests for supplies from the United Kingdom and Combined Food Board.

The Feeding Stuffs Act standardizes the quality and regulates the sale of feeds used in Canada. Registration is required of mixed feeds and concentrates, mineral feeds, and protein-mineral supplements for live stock and poultry, and these are required to be labelled to show the name and address of the manufacturer, guaranteed analysis, ingredients, and registration number.

Contact is maintained with authorities on nutrition throughout the Dominion, and, as knowledge advances, appropriate amendments are made to the legislation to ensure that the public shall have the full benefit of important developments.

The Fertilizers Act prescribes minimum quality standards for commercial fertilizers. Registration is required for each mixed fertilizer sold in Canada, and each package containing the fertilizer must be labelled with the name and address of the manufacturer or importer, the brand name, registration number, and guaranteed analysis.

Provincial Fertilizer Boards have been set up throughout Canada which make recommendations regarding the fertilizer formulae best suited to their needs.

The Pest Control Products Act applies to all the pesticides used in agriculture, industry and households. Examples are insecticides, fungicides, vermifuges, rodenticides, and disinfectants. Pesticides are standardized at levels of recognized effectiveness. Each is registered and containers bear the allotted registration number, a statement of guarantee in the prescribed form, and the manufacturer's name and address.

The Plant Products Division also administers the Inspection and Sale Act dealing with binder twine, and the Hay and Straw Inspection Act.

The above mentioned Acts are enforced by a staff of trained inspectors who visit all parties interested in the products under control. The observed effect of all such legislation is to raise the quality of the commodities sold, to increase public demand for them, and thus to stimulate food production.

Laboratory services have been set up to support the enforcement of the Acts briefly described above. The laboratories provide facilities for testing seeds for purity and germination; the chemical analyses of fertilizers, pesticides, and feeding stuffs; the microanalysis of feeding stuffs; and the measurement of binder twine. In addition to these services, vitamin assay of feeding stuffs is performed, and in an insecticide testing labor-

atory just opened, household and industrial fly sprays are tested in a Peet-Grady chamber.

The seed laboratories also give to farmers and other interested persons information regarding seed testing and the identifications of seeds. Collections of forage crops and weed seeds for educational purposes are prepared and distributed at a nominal cost.

6. MARKETING OF FARM PRODUCTS

PROVINCIAL ACTIVITIES

The provincial departments of agriculture are all concerned with marketing and provide assistance in various forms. Nova Scotia, Quebec, Ontario, Saskatchewan and British Columbia have separately organized marketing divisions or branches. Other departments provide service in one way or another, frequently through divisions and officers who combine a variety of functions.

All departments are concerned with grading and inspection and all have enacted legislation in some form pertaining to such. In some provinces a general act covers all products; in others special acts have been provided. The maintenance of a provincial staff of graders is not common but at least one province does provide such a service. Dominion standards apply in inter-provincial and export trade and in most provinces to products sold in intra provincial trade. In certain provinces, however, special grades have been established by the province for products sold within the province.

Grading and Inspection

Grading and inspection is for the most part done by Dominion staff. The authority for this is provided in provincial statutes in most instances, though not all. These arrangements will be discussed in more detail in the section describing Dominion activities in marketing. In the main it can be said that the provinces have shaped their program and tried in various ways to co-ordinate their activities to fit with those of the Dominion. While the provinces are concerned with certain aspects of local marketing in their own exclusive right, the fact that most products enter interprovincial or export trade in some volume and thus come under Dominion jurisdiction as regards grading and inspection, causes the provinces to rely on the Dominion for the major effort in this field.

Marketing actually begins with production. Recognizing that fact the provinces have assisted farmers in various ways to produce what the market requires. Districts have been organized to produce certain products so that volume will be available for economical handling. Varieties have been standardized by eliminating undesirable types. Demonstrations have been given on preparation of products for market. In some instances, products have been assembled, graded, packed and marketed by departments of agriculture in order to develop an industry. As an inducement to produce and market better quality products, provinces have resorted to the policy of paying premiums for quality products.

Assistance to Cooperatives

Provincial governments have given a good deal of help in the formation of cooperative marketing associations. Legislation to facilitate incorporation, along with assistance in organizing, is provided by all prov-

inces. Most provinces also give financial and supervisory assistance. This activity has also been extended to other fields, including cooperative purchasing of supplies and the operation of credit societies.

This policy of assistance has included provincially operated agencies for the actual marketing of certain products. In the main, however, these activities have been intended as demonstrations, the ultimate purpose being to have farmers take over and operate such agencies on a cooperative basis.

Other Activities

Provincial governments have aided in one way or another the construction of facilities for marketing, e.g., cold storage plants and stock yards. These in turn have been made available for the use of private traders and co-operators alike. In contrast to this, encouragement and assistance has been given to consolidate cheese factories where a multiplicity of small units has led to inefficient operations.

Assistance is provided in connection with the manufacture of dairy products. Provincial dairy instructors work with the operators of cheese factories to help improve the quality of the product. Research facilities and assistance is provided to deal with problems encountered by processors and others preparing products for market.

Markets extension and markets news services are important parts of the program of many provincial marketing divisions, particularly in the provinces where a variety of perishable products are produced. The extension activities have included special surveys of marketing opportunities in other parts of Canada and in countries abroad. Markets information or news is provided through the press and radio daily and at other intervals. This service also includes advice to consumers as to quality of products, movement to market, duration of marketing period, where to purchase for preserving and similar information.

The services of provincial governments, usually through the departments of agriculture, have been extended during the past decade to include the provision of authority enabling producers and the trade to regulate the marketing of specified products including the determination of prices to be paid and to be charged, under stated conditions. These activities have for convenience, and because of their nature, been included as a special section of this brief.

DOMINION ACTIVITIES

The Marketing Service of the Dominion Department of Agriculture was created in 1937 by bringing under one administration several separate Branches concerned with marketing and economic research. At that time, too, the markets information and statistical services were combined and a consumer service section established.

Under the Marketing Service as now established the grading of livestock and livestock products, dairy products, poultry, eggs, fruits, vegetables, canned goods, maple products and honey are centralized. Departmental advertising is also handled by the Service.

Markets Information

The functions of the Markets Information Section include the collection, compilation and dissemination

of market comment, prices and statistics on the production and sale of commercial livestock, fruits and vegetables, and dairy products on the domestic and export markets.

Material in the form of comment, receipts and prices is supplied daily to the CBC Farm Broadcast program by officials of the Marketing Service of the Department at the various marketing centres. This service covers the commercial marketings of livestock, fruits and vegetables, and dairy products. Canada is now blanketed from coast to coast with this service from Monday to Friday each week.

Livestock.—Statistical information on Canada's commercial livestock production, marketings and exports of livestock or meat products is compiled and published in regular weekly and monthly reports, and an annual report issued covering the year's marketings and prices at the principal marketing centres. Through the co-operation of officials of the Department and the industry at the various stockyards and packing plants, the numbers, prices and disposition of each class of stock are secured, so that these reports might be released for the benefit of producers and the trade generally. Monthly and annual reports are issued showing the origin of all commercial livestock marketings by counties or crop districts. Special and supplementary information is released from time to time as occasion warrants.

Fruits and Vegetables.—Weekly Crop and Market Reports are published regularly on each Thursday throughout the year. These cover the main commercial crops in the principal producing sections of Canada and report crop conditions and wholesale market prices in the larger distributing centres. Annual crop and price summaries are published as supplements to the weekly report. The Potato Market Report is issued from Monday to Friday, inclusive, throughout the potato shipping season. Price records, storage figures, unload reports, etc., are maintained, and some special reports prepared for officers of this Department and other Wartime Departments and Boards. There is co-operation with the Dominion Bureau of Statistics in the compilation of storage and crop reports.

Dairy Products.—Reports on the dairy produce markets are published each Monday throughout the year. These reports cover the butter and cheese markets in Montreal, Toronto, Vancouver and New York during the previous week, and in Montreal and Toronto the day of issue. Market telegrams are sent each Monday and Friday to provincial dairy officials and others desiring information. Statistics relating to the industry are compiled regularly.

Special Services.—This Section supplies special information to other divisions in the Department. Price reports on the major agricultural products are prepared daily and sent to the chief executives of the Department. A monthly summary of the export trade in agricultural products is prepared and circulated. During the year, numerous requests for statistical analysis and information on prices and agricultural production and trade are received from various sources within and outside the Department.

Consumer Service

The purpose of Consumer Service Section is to familiarize consumers with existing food regulations which are under the jurisdiction of the Department. Grading regulations and grade marketing are interpreted to the buying public so that consumers can use their food money to better advantage and thus build a better domestic market. Assistance is given in any special emergency marketing situation created by either a shortage or surplus of supply.

Consumers are informed of supplies of foods available. This has been an important part of the program throughout the war and still continues as the food situation changes.

Consumers are also advised on ways of using available home-grown foods to best advantage. In this connection experimental work is carried on in a testing kitchen, the cooked foods being scored for palatability and retention of food value. Foods being marketed in new forms are tested and advice is given on best methods of cooking. This has been particularly true with new products developed for overseas shipment including dehydrated eggs and vegetables. Other experimental work has included baking with the new vitamin B white flour "Canada Approved"; and reducing amounts of sugar in cooking. Much experimental work has also been done on methods of preservation of fruits and vegetables. In this work, products grown under the varying conditions of the fruit producing provinces have been compared. Results are checked with provincial extension workers, universities and other authorities.

Dissemination of Information.—To reach consumers, various methods are used. The direct work is carried on mainly with urban women as close co-operation with provincial extension workers allows the information to reach rural workers, indirectly. In some cases, work is done in rural communities on the invitation of these officials.

Lectures and demonstrations are given by all members of the staff on choosing, preparing, serving and preserving agricultural food products, explaining their variety, standards, grades and best use.

Publications are issued covering the Canadian agricultural products. At present there are sixteen household publications available in English and French. One-page mimeographed leaflets are also released to meet special demand related to changed market conditions.

Exhibits are arranged as part of the Departmental exhibit for fairs. Small exhibits for use at conventions, school closings and other meetings, and to extension workers for use at local meetings, are loaned on request.

Radio talks are given each week on the agricultural program "Food Facts and Food Fashions". Material is prepared for distribution to commentators on stations across the Dominion. Press articles are written weekly for release to daily and weekly papers. Films are shown and discussed as they bear on the work of the Division. Correspondence dealing with problems met by women in their homes is extensive and the questions varied. It forms a large part of the effort to give Canadian consumers up-to-date correct information.

Co-operation.—The work of the Section is planned in close conjunction with divisions of the Department on matters where production and marketing are related

to consumption. The Section co-operates with the Nutrition Division of the Department of National Health and Welfare on matters where nutritional value has a bearing on the use of food.

Similar arrangements are maintained with the War-time Information Board, the Consumer Branch of the Wartime Prices and Trade Board, and Women's Voluntary Services. Association with groups such as the Inter-departmental Committee on Consumer Information; Canadian Council of Nutrition; Executive Committee of the Canadian Association and the National Film Board enables the Section to offer technical advice on matters relating to food.

The Section also has very close contacts with home economists and others in extension services, industry, health services, schools and voluntary organizations, and assistance is given them whenever it would be of value.

Dairy Products

The Dairy Products Division traces its origin to the appointment of a Dairy Commissioner in 1890. The Commissioner was also named Agriculturist at the Central Experimental Farm. In 1895 the two positions were combined and the holder designated as Agricultural and Dairy Commissioner. In 1902, the Dairy Branch, as it was termed, included Divisions dealing with dairying, livestock, fruit, extension of markets, poultry and cold storage.

In succeeding years, as the activities not directly related to dairying were increased, they became the bases for other branches. Other changes were made in the activities of the Dairy Branch at different times and in 1937 with the reorganization of the Department of Agriculture, the Branch became The Dairy Products Division of the Marketing Service.

The Dairy Products Division administers the Dairy Industry Act, the Cheese and Cheese Factory Improvement Act, and the Cold Storage Act, and Regulations under each; also the Regulations under the Meat and Canned Foods Act with respect to the inspection of concentrated milk products. General supervision of all activities of the Division is maintained by the Administration Service, directed by the head of the Division. It is international in its scope, and keeps in touch with the development of the dairy industry throughout the world.

Iced Car Service for Cheese, Butter, and Eggs.—Arrangements are made with the different railway companies to operate weekly a number of iced refrigerator cars during the summer months for the purpose of transporting cheese to Montreal, Quebec, and Halifax for export, and l.c.l. shipments of butter and eggs over specified routes from Toronto, Montreal, Quebec and Halifax. Inspectors are maintained at Toronto, Quebec, Montreal, and Halifax to inspect the cars on arrival at destination. The results of their inspection are transmitted to the appropriate authorities.

Cargo Inspection.—Cargo inspection is applied to perishable produce, including not only dairy products, but also meat, eggs, fruit, etc., shipped from Canadian ports. Inspectors are maintained at ports both in Canada and the United Kingdom for the purpose of supervising the loading, stowage and discharge of this type of cargo, and reporting on the condition of these perishable products and of the packages containing same.

At the time of loading, thermographs are placed in the holds of the vessels to record the temperatures maintained during ocean transit. Reports covering inspection from time of shipment to discharge in the United Kingdom, together with blue print copies of the temperature charts, are forwarded through the Ottawa office to appropriate officials and others concerned.

Supervision of Concentrated Milk Plants.—By mutual arrangement and understanding with provincial authorities, an officer of this Division supervises, inspects, and gives technical advice to concentrated milk plant operators with respect to the products manufactured by them. Ordinarily, the supervision of the manufacture of dairy products is performed by provincial authorities. In the case of concentrated milk plants, however, the number is comparatively small in each province and the work is of a highly technical nature, with the result that no province of Canada has as yet appointed an officer to supervise this phase of the manufacture of dairy products.

The Cheese and Cheese Factory Improvement Act.—This Act is designed to promote and foster the production of cheese of high quality; the amalgamation of two or more existing cheese factories into one larger and more economical unit; a more adequate method of handling and ripening cheese in the cheese factory by means of controlled temperatures and humidity by providing financial assistance with respect to the insulation and refrigeration of cheese factory ripening rooms; standardizing the size of Cheddar cheese by providing financial assistance with respect to standardizing of cheese processing equipment. The benefits of the Cheese and Cheese Factory Improvement Act are available to the industry throughout the whole of Canada regardless of whether or not the cheese manufactured is for provincial, interprovincial, or the export trade.

Cold Storage.—The Cold Storage Act administered by this Division may authorize financial assistance under certain conditions with respect to providing facilities for the proper storing and handling of perishable food products. The benefits as provided by this Act are available to anyone in Canada, and the products stored may be for export, the domestic markets, or for provincial and local trade.

Grading and Inspection.—A service of grading cheese and butter and inspecting dairy products for composition, weights, branding, packaging and so forth is provided by the Dominion Government through the Dairy Products Division. In accordance with the Dairy Industry Act and Regulations thereunder, all butter and cheese must be graded before being exported. However, the service of grading butter and cheese is not confined to the export trade. A grading service is available to the industry in any province regardless of the market in which the cheese or butter is to be sold. In addition to commercial grading, an educational score, which includes analysis for composition in the case of creamery butter, is also given in those provinces where a request has been made and arrangements completed for such a service.

These are the only grading facilities available to the industry in any province. In addition, the grading and inspection of dairy products constitute, with few

exceptions, the only organized service of analyzing butter, cheese and ice cream for composition. The results of the inspection and grading of dairy products are used by the industry and provincial authorities as a basis or a guide for them in the manufacture of dairy products and supervision of factory work.

Publications.—Pamphlets and publications dealing with the construction of cold storages, ice storages, plans for cheese factories and creameries, the manufacture and testing of dairy products, and other items of importance to the industry are issued by the Division. These publications are available to anyone interested, and are used extensively by dairy schools and dairy departments of universities.

Two publications, the Dairy News Letter and the Cold Storage News Letter are issued monthly to the trade.

Other Activities.—These include the reporting of market conditions to the Markets Information Section, by officers of the Division located at the various grading centres throughout Canada; the provision of judges to judge cheese and butter at provincial and county exhibitions and the furnishing of instructors for dairy schools and Colleges of agriculture to assist in instructional work in the manufacture of dairy products.

Although the activities of the Dairy Products Division are for the most part associated directly with the industry, trade, provincial authorities, and professional members of dairy schools and universities, and only indirectly with farmers, yet these activities are designed to assist and are of benefit to the producer.

Fruits and Vegetables

Part IX of the Inspection and Sales Act commonly known as the Fruit Marks Act was enacted in 1901 and from the date of its enactment until 1914 was administered by the Fruit Division of the Dairy and Cold Storage Branch. In that year the Fruit Division was separated from the Dairy and Cold Storage Branch and was named the Fruit Branch which in the Departmental reorganization in 1937 was renamed the Fruit, Vegetables, Maple Products and Honey Division. In 1914 the Fruit Marks Act was repealed and replaced by the Fruit Act. The scope of the Act was gradually expanded, at the instance of the industry and extended beyond the grading and packing of apples to the grading and packing requirements for the other main fruit crops and the same kind of fruits when imported.

The Root Vegetables Act was passed in 1922, applying to the grading and marketing of potatoes and onions. Later other vegetables were provided for.

Originally, only administrative inspection service was maintained, but commencing in British Columbia in 1925, a voluntary commercial service of shipping point inspection and certification was inaugurated and spread throughout the Dominion at the request of the industry. At present this service applies to the export of, and the main interprovincial movement of, fruits and vegetables.

The Meat and Canned Foods Act, as it pertains to fruits and vegetables, was placed under the administration of the Fruit Branch in 1929. Two years later the Maple Sugar Industry Act was enacted and placed under administration of the Fruit Branch.

In 1934 the Fruit Act was amended to provide for the classification and grading of honey and the proper labelling of containers, thereupon being named the

Fruit and Honey Act. In the same year the Act was amended to provide for the licensing of interprovincial, export and import dealers, brokers and commission agents handling fruits and vegetables.

The Fruit and Honey Act was consolidated with the Root Vegetables Act into the Fruit, Vegetables and Honey Act in 1935.

Establishment.—The establishment of the Fruit and Vegetable Division consists of the Head Office Staff at Ottawa; 4 Inspection Districts, each under a District Inspector—Nova Scotia, Quebec, Western Ontario, and British Columbia and Alberta; and 4 sub-Districts, each under a Senior Inspector—Prince Edward Island, New Brunswick, Eastern Ontario, Manitoba and Saskatchewan. Much of the staff of the Division is employed for periods ranging from a few weeks to several months, depending upon the length of the shipping season.

The work of the Division is divided into three sections: Administrative, Fruit and Vegetable Inspection, and Marketing and Merchandising.

The Administrative Section looks after all administrative details, including appointments, estimates, expenditures and files. Fruit and Vegetable Inspection looks after all inspections of fruits and vegetables, both raw and processed, and maple products and honey. Marketing and Merchandising administers the licensing regulations under the Fruit, Vegetables and Honey Act and handles all transportation matters including railway tariffs, equipment, etc.

The Division administers; (1) The Fruit, Vegetables and Honey Act, including compulsory and requested shipping point inspection and certification of fruits, vegetables and honey, requested destination inspection on both domestic and imported fruits and vegetables and licensing regulations covering interprovincial or international traders in fruits and vegetables; (2) The Meat and Canned Foods Act as it pertains to fruits and vegetables including the licensing and supervision of canning establishments handling fruits and vegetables; (3) The Maple Sugar Industry Act including the licensing of interprovincial or export packers and producers and the establishment of standards for maple produce and the proper identifications thereof.

In addition to the administration of the above mentioned Acts, the Division co-operates with Science Service and provincial Departments of Agriculture in conducting an annual apple maggot survey in Eastern Canada and in maturity tests on small fruits. It works with other Divisions of the Department, with the Bureau of Statistics, and with provincial Departments in the collection of crop and market information and storage statistics.

Since the outbreak of the war, the Marketing and Merchandising Section has acted as a Fruit and Vegetable Products Section of the Special Products Board and has attended to the preparation of contracts with the British Ministry of Food, the securing of supplies and arranging for shipment and payment. The products handled have been fresh and evaporated apples, concentrated apple juice, dried apple pomace, canned apples, dehydrated vegetables, canned tomatoes, canned corn, dried peas, dried beans and fruits in SO₂. The production of these products, especially of apples and dehydrated vegetables, has greatly increased the work of the inspection staff in checking raw materials and finished products.

Co-operation with Provinces.—In the early years of the Division's history the question of jurisdiction was not raised but in recent years this question has come to the fore. Certain of the provinces passed "enabling" legislation and under such legislation the Division inspectors by administrative inspection of produce at the packing and shipping points and produce in the hands of wholesalers and retailers in centres of consumption wherever an inspection staff is maintained, enforced the principal requirements of fruits and vegetables in intra-provincial trade. This applied mainly to the statutory provisions against sale of undergrade fruits or vegetables or of produce not meeting the requirements of the marked grade; and to overfacing, and slack packing.

Such legislation has, in recent years, been considered unenforceable and the fruit growing provinces have moved toward the enactment of legislation paralleling the Dominion Act. Under such an arrangement, Dominion inspectors are also appointed provincial inspectors for enforcement of such legislation along with other primary functions respecting interprovincial, export and import trade. It is under such plan that the Division now co-operates with the provinces in the administration of grading and inspection services.

Livestock and Livestock Products

In 1904 the Livestock and Poultry Divisions of what was then known as the "Dairy Branch" were combined under the name Livestock Branch. In 1937 the Livestock and Livestock Products Division was formed from part of the former Branch, and became a part of the Marketing Service. The principal duties of the Division are related to the marketing and grading of livestock and livestock products.

Livestock Inspection and Grading. — The oldest activity is the stockyard service, which involves certain controls over public stockyards. The grading of live hogs was commenced in 1922, and beef grading in 1929. As the need for greater markets, both domestic and export, for meat products became apparent, these services were expanded and new ones added.

Stockyards.—As protection to the buyer and seller of livestock certain requirements are made with respect to trading on public markets. Sales agencies and dealers must be bonded, and must place funds received from the sale of livestock in a Shippers' Trust Account. All records must be bona-fide and open for inspection. Schedules of commissions and charges are subject to official approval, as also are scales and weighmasters. Stockyard proprietors are required to provide adequate accommodation and services, as well as good feed at fair prices. An official representative is located at each of the eleven stockyards in Canada to administer the regulations and prepare regular market reports. Certain controls are also exercised over packers' yards in the case of livestock purchased by the packer direct from the country.

Hog Carcass Grading.—All hogs delivered for slaughter at stockyards and packers' yards are carcass graded by official graders. As the live hog grading system developed, it became evident that a more accurate method of appraisal was desirable in order that returns to the producer could be based on the quality of the export Wiltshire sides. Experimental work was carried out for a few years and in 1934 an optional carcass

grading service was made available. This system steadily increased in popularity with both buyer and seller and in 1940 live grading was discontinued and hog carcass grading made the official system. Official graders grade the carcasses on the packing house rail and issue certificates which are required to be the basis of settlement to the producers. While not required by regulation, the trade now purchases hogs on the basis of carcass weight and this system is officially encouraged as the most equitable as between buyer and seller. Scales for weighing carcasses are automatic and are under the supervision of the official graders.

The settlement to farmers for hogs on a quality basis has been the means of standardizing the type of hog produced throughout Canada, and this has been reflected in a greatly improved standard of quality in both the domestic and export product.

Bacon Grading.—Export Wiltshire sides and cuts are graded in accordance with official standards and labelling and branding are done as prescribed. Previous to the war an inspector was maintained in the United Kingdom who checked shipments on arrival and forwarded reports to Canada on the grading and condition.

Seaboard Inspection.—A staff of inspectors work under the Meat Board at the Canadian seaboard, sampling each shipment from each plant. Reports are made covering grading, workmanship, condition, and weight. This information is relayed to the packers, and penalties applied in certain cases. Further, a Bacon Specialist visits each plant periodically to check on the workmanship and method of processing. By these means the manufacture of export bacon has been standardized at a high level. Much attention has also been given to the refrigeration of railway cars and ocean vessels, as well as the handling at the docks, so as to assure the arrival of the bacon in the United Kingdom in the best of condition.

Beef Branding.—The beef grading service involves the official approval and ribbon branding of "Choice" and "Good" federally inspected beef on an optional basis. By giving the consumer a chance to easily recognize beef of high quality, the demand for that product is expanded with resulting benefit to the producer of beef cattle. Practically all beef eligible for the red brand is now being branded and a high proportion of the "Good" quality receives the blue brand.

Provincial legislation in the province of British Columbia requires that all beef sold in the area of Greater Vancouver shall be graded and branded. The Federal Department of Agriculture is co-operating with the Provincial Department by providing graders of the Livestock Inspection and Grading Services to grade the beef.

Lamb Carcass Grading.—Experimental work in the grading of lamb carcasses was begun in Ontario in 1938 at the request of producers organizations. Regulations establishing grades were authorized and a grading service inaugurated in the Maritime Provinces in 1939, where it has been continued on an optional basis ever since. The Nova Scotia Department of Agriculture has matched this service with a special program of sheep promotion.

Wool Grading.—All wool marketed through the regular channels in Canada must be graded according to

official standards. Grading is done by employees of the warehouses under the supervision of inspectors of the Department.

Dairy Cattle Export.—Regulations controlling the export of dairy cattle to Great Britain are administered by these Services.

Other Activities.—These include the collection of data on livestock marketing for the Markets Information Section; assistance to Meat Board with reference to slaughter control and beef grading; assistance to the Wartime Prices and Trade Board and Department of National Defence with respect to meat supplies, advanced registry inspections and slaughter tests, quarterly pig survey, judging at exhibitions and the preparation of Departmental exhibits.

The Division works with provincial Departments of Agriculture in various ways. Several provinces have paid hog bonuses or subsidies based on official grading and the necessary records are made available. At present the Federal Department is paying the Ontario Hog Subsidy on behalf of the Ontario Department.

Educational work carried on jointly with the provincial extension services and other agencies and designed to relate grading results to production on farms is an important activity of the Division.

Poultry

The present Poultry Section of the Livestock and Livestock Products Division was created from what was, before the re-organization of the Department, the Poultry Division of the Livestock Branch. Included in the work of that Division were also activities which are now incorporated in the work of the Livestock and Poultry Division, Production Service, and which activities are dealt with in the report of the Production Service.

The Poultry Section of the Marketing Services has four main activities; (1) The application of egg grading; (2) The application of dressed poultry grading; (3) Market reporting service on poultry products; (4) The application of grade standards for canned poultry. The first three of these activities were instituted under the Poultry Division of the Livestock Branch. The fourth has been instituted recently under the Poultry Section of the Marketing Service.

Egg Grading.—Canadian standard grades for eggs were established by regulations under the Livestock and Livestock Products Act in 1915. Prior to that time some preliminary work had been done in the general field of egg quality control through what was known as the "Loss Off" program, under which buyers agreed to remove and not pay for eggs which were unfit for human consumption. Following the introduction of Canadian grade standards, the Winnipeg Board of Trade issued inspection certificates on carlots of eggs which were graded according to Canadian standards and which were inspected by departmental officers. This was the first effort in the introduction of standardized grades.

In 1918, Dominion regulations were adopted making the use of standard grades compulsory on eggs moving interprovincially in carlots and on export shipments; requiring the inspection of such shipments by a departmental inspector and the issuance of an inspection certificate before shipment. In 1922 regulations were enlarged to include import shipments, and in 1923, were extended to cover all eggs bought and sold in Canada.

Shortly after the introduction of the latter regulations the various provinces established regulations under their own authority giving force to the Dominion regulations insofar as they touched on matters which were definitely of provincial jurisdiction.

Poultry Grading.—The Canadian standard grades for dressed poultry were established by regulations under the Livestock and Livestock Products Act in 1928. At that time the application of the standards was on a voluntary basis with the only provision being that poultry marked with a standard grade name had to comply with the standard requirements. These voluntary grades were used very widely in a carlot trading way, particularly in the Prairie provinces where the great bulk of the poultry was graded according to standards and inspected by departmental officers before shipment.

In 1934 the regulations were amended to include compulsory grading and inspection for export shipment. They were further amended in 1940 to include import shipments, and in 1943 to provide that all interprovincial carlot shipments be graded according to the standards and inspected before shipment. The amendments to the regulations in 1943 also included the provision that poultry could be graded and packed according to Canadian standards only in registered poultry packing stations and that all poultry offered for retail sale was to be graded and marked according to Canadian standards on the adoption of the necessary legislation by the provinces. Since that time legislation has been passed by the provinces of Manitoba, Ontario and Quebec requiring the sale of poultry by grade in the cities of Winnipeg, Montreal, Quebec, Toronto and Ottawa.

Canned Poultry.—Regulations establishing grade standards for canned poultry were enacted under the Livestock and Livestock Products Act in 1943. The use of these standards is compulsory in interprovincial and export trading. In local trading their use is optional, the only provision being that any canned poultry marked with the standard grade name must comply with the standard requirements with respect to quality and grade. The regulations also include that poultry shall be canned only in premises which have been registered by the Health of Animals Division of this department or, in the instance of stations packing poultry for domestic trading, registered by the Poultry Section.

Egg and Poultry Reports.—Information on egg and poultry market conditions and prices is furnished weekly to Ottawa by the various district and local offices of the Poultry Products Inspection Service. This information is incorporated in printed weekly reports in both languages and is circulated free on request to individual parties. The market information assembled by the district offices is also given to the local press and radio and in most areas the office of the Inspection Service is regarded as the source of official market information on eggs and poultry.

Co-operation with Provinces.—The functions of the Poultry Section of the Marketing Service centre very largely around the application of grade standards for poultry products. The Dominion is regarded as having competent jurisdiction over this field where the product moves interprovincially and out of or into the country. The provinces are regarded as having competent jurisdiction, under the general authority to legislate on Property and Civil Rights where the product is bought

and sold solely within the province. There has been general recognition, in the interest of standard merchandizing, of the advisability of the Dominion retaining operational jurisdiction over the grading and inspection of poultry products and this has been made possible by the provinces enacting the necessary legislation making the basic Dominion legislation operative within their domain.

In this general field there has been close co-operation between Dominion and Provincial authorities. When the early type of Provincial enabling legislation was found by appeal court judgments to be inadequate, the provinces readily changed the type of this legislation to promote continuity in the operation of grading policies. All inspectors appointed under the Poultry Section to administer grading legislation are also named by the provinces to enforce their legislation in the same field. There is close co-operation between the various district offices of the Poultry Products Inspection Service in each province and the local Provincial authorities in all matters touching marketing and in which grade standards play a part. The Provincial officials have worked closely with the Inspection Service in educational activities directed toward the improvement of quality of poultry products.

Agricultural Economics

The Agricultural Economics Division serves as a fact finding body in matters relating to production and marketing. The Division is concerned with costs of production and marketing, with studies of farm business, land use, mechanization, land settlement, methods of handling and distributing farm products and factors affecting consumption. The activities of the Economics Division are outlined in more detail, along with similar provincial activities, in the section dealing with Economic Research.

7. AGRICULTURAL EXTENSION

PROVINCIAL ACTIVITIES

All of the provinces provide an extension service in one form or another. It is either a Division of a College or Provincial Department of Agriculture which embraces agricultural representatives, agronomes, horticulturists, and specialists in various fields. In some of the provinces, however, the agricultural representatives are under the direction of the Department of Agriculture while the extension service is a unit operated from the College of Agriculture.

In all instances, however, regardless of the organization a large part of the educational work and leadership provided by departments and Colleges of Agriculture reaches farmers through the activities of agricultural representatives. These men are located throughout the various provinces, their territory comprising a county or a group of rural municipalities. They arrange short courses, field days, and demonstrations; give advice on such matters as fertilizers, seeds, insects, diseases of live stock and eradication of weeds; assist with agricultural society activities and junior club work; help farmers to obtain labour, to exchange machinery; and generally act as the local agent in carrying out the programs and policies administered by the Departments of Agriculture. In the conduct of a good deal of this work the agricul-

tural representative is assisted by specialists provided by the Dominion and Provincial Department or the College of Agriculture.

In addition to the work conducted through the agricultural representatives the various extension services publish and distribute bulletins, reports, press articles and other printed matter. They also make extensive use of the radio.

During the war years, the provincial extension services have played an important part in facilitating joint action and co-operation between Dominion and Provincial agencies. The district representatives were active in the organization of provincial and county committees designed to increase production and allocate farm manpower equitably and effectively.

DOMINION ACTIVITIES

The educational or extension activities of the Dominion Department of Agriculture may be considered as falling into two broad classes. One is represented in the daily round of activities of various Services and Divisions; the other in the specialized program of the Division of Publicity and Extension.

The first of these is not a formally organized activity. The Department has no special division for the kind of extension work here implied nor does it employ trained extension specialists. On the contrary, it recognizes the responsibility of the provinces in this field. Yet it will be obvious that the policies and programs of the Department and the results of experimental and research efforts must be made known.

Much of the Department's effort in this respect is at a level that is not likely to overlap or impinge upon provincial authority. Departmental officers, whether administrators or research workers are frequent and welcome speakers at meetings and conventions of provincial and national societies of many kinds.

But the Dominion Department must also reach out to the level of the local community and its farms. Dominion experimental farms are scattered throughout Canada to serve farmers. The laboratories of the Science Service are in close contact with farmers everywhere. The activities of graders and inspectors of the Marketing Service conducted at a distant packing plant or produce market must be made effective by carrying results back to the man on the land. The Dominion must therefore make known to farmers and others what is being done and must be in a position to serve them on request.

It is at this level that there is danger of conflict or of overlapping of services. Neither legislation nor arbitrary divisions of authority will prevent such a development. There has to be mutual agreement, understanding, and willingness to co-operate.

Fortunately, over a period of years such a relationship has developed. There were areas of conflict some years ago; differences of viewpoint and something less than complete co-operation may still develop on occasions. But such instances are rare. Dominion officers are participating in extension work at all levels under arrangements that appear, on the whole, to be satisfactory. The things that may be considered as characterizing the present relationship are (1) recognition by the Dominion or provincial interest in this phase of extension, and (2) the desire of provincial agricultural workers, fre-

quently expressed that the Dominion Department might provide more information and assistance.

Demonstrations, Reports and Publications.—One of the most effective forms of education is demonstration. In this field the Dominion Experimental Farms are predominant. Many thousands of farmers visit the scores of experimental farms and stations throughout Canada each year. Much of this is on an organized basis—various associations arranging field days for their members. Others visit the farms individually for consultation or study.

A considerable part of the time of officers in all services is devoted to discussions with farmers, association officials, representatives of marketing agencies and other persons who come to the offices for advice.

Finally there are the bulletins and reports. These are of two broad classes—individual publications reporting the results of research studies or describing some program; and those that appear regularly with market information, summaries of business conditions or discussions of what is going on in agricultural circles in other countries. These reports go to a large number of people—not just farmers; business men, dealers in farm products, bankers, railway officials and many others use these reports to keep abreast of developments in agriculture at home and abroad.

Publicity and Extension

Through the medium of extension activities already discussed, important and effective as they are, the Dominion Department of Agriculture can reach but a part of the farmers and other people that it desires to serve. It must, therefore, employ other means. Accordingly, it makes extensive use of the press, of radio and of exhibits, slides and film. Its activities in these fields are centred in one Division.

The Division of Publicity and Extension as presently constituted followed the amalgamation of the former Publications Branch of the Department with the Division of Extension and Publicity under the Experimental Farms System. This amalgamation comprised the Publicity and Extension Branch under which there were three Divisions—Press and Publicity, Exhibits, and Administrative and Editorial. Later, when the Department was re-organized on the basis of services, this unit became the Publicity and Extension Division attached to the Administrative Service.

Administrative and Editorial Section.—This Section looks after the editing, publication and distribution of Departmental reports, bulletins and circulars. All details in connection with the requisitioning and printing of such publications are handled in this unit which also maintains a stock room and mailing facilities for handling bulk distribution, as well as dealing with individual requests for information received from farmers and the general public. A duplicating pool serves the whole Department and a large volume of material in the form of market reports, news releases and topical leaflets is processed and distributed through regular channels. A printed list of Publications is issued annually, showing by title and number, the publications which are available for distribution.

Exhibits. — The departmental educational exhibit work is under the supervision and direction of the

Exhibits Section. The work of this Section includes the making up of exhibit structures which serve as vehicles for the displaying of panels, charts, models of farm buildings, new grain varieties, specimens of home canning, plant and animal disease specimens, and other educational display material. A workshop is maintained where these exhibits are built, and where the panels and signs are lettered, posters decorated, electrical wiring and all structure finishing and decorating done.

During the war years particular attention has been devoted to emphasizing the necessity for increased production of food stuffs and to demonstrating labour saving devices for the farm. With the approach of victory there is a constantly growing demand for information that will assist the farmer in his post-war planning. Exhibit work is accordingly being reshaped in keeping with these demands.

Press and Publicity.—Much of the most important work of the Department is directed towards research and experiments for the purpose of science, agriculture in Canada will be advanced and the economic lot of farmers improved. It is important that information on these matters and on other activities be made available to farmers and the public generally. The job of disseminating such information to press and radio comes under the Press and Publicity Section.

A continuous news and information service is maintained to press service, to daily, weekly and farm papers, and to other publications which have a direct or indirect interest in Canadian agriculture. A special feature is made of reviewing briefly and comprehensively new departmental bulletins and pamphlets as they are published. Photographs are supplied for illustrating articles and for illustrating encyclopedias containing articles on agriculture in Canada; also for school text books and other books in which farming is featured.

Members of the Press and Publicity staff attend agricultural fairs, business meetings of farmers, field days at Experimental Farms throughout the Dominion for the purpose of meeting practical farmers and learning from them their problems and their needs in the way of information.

Ideas for articles are suggested to editors and special writers, and for broadcasts to radio producers. On occasions assistance is given to national press and radio agencies to obtain coverage of agricultural events which otherwise would not have been publicized.

Since the introduction of the CBC Farm Broadcast in 1939, now a half-hour program five days a week, Press and Publicity has been closely associated with the program and a substantial contributor.

The section has expanded its advisory services on agricultural films, film slides and film strips produced or distributed by the National Film Board. The Division operates a Lantern Slide Bureau.

8. THE DOMINION WARTIME AGRICULTURAL PROGRAM

For some years prior to the outbreak of war, Canada like other food exporting countries had experienced difficulty in finding markets for surplus products. While it was thought by many that the war might bring, almost

at once, a greater demand for Canadian products—and prices reflected this anticipation for a time—the actual result was quite different. There was in fact an almost immediate reduction in the demand for certain products. One of the first problems that Canadian authorities had to contend with was the development of a program to handle the apple crop, then actually being marketed, when it was announced that the United Kingdom would be unable to take her usual volume.

The uncertainty that existed during this period and throughout the first year of the war—the impossibility of developing a comprehensive production program—was disconcerting and led to some unrest among farmers. Conferences were held with provincial authorities, however, and farmers were requested to continue producing as they had been doing, to maintain their plant and equipment and to await further developments. Meanwhile, as the situation clarified to some extent contracts were negotiated with the United Kingdom for the export of bacon and cheese.

Apart from the question of markets one of the most urgent problems faced at the outbreak of war concerned the supply of feed, fertilizer, insecticides and similar products required in the production program. Many of these things had previously been imported and the supply was either threatened or eliminated entirely with the advent of war. Accordingly it was necessary to take immediate steps to facilitate domestic production of those products that could be produced in Canada, and to obtain quantities of other products from Allied or neutral countries.

CHANGE IN SUPPLY POSITION

When the invasion of Norway, Denmark and the low countries and the intensification of submarine warfare changed the food position of the United Kingdom it became necessary to draw upon Canada for more products, and to feature those that were high in food value relative to volume. Live stock and dairy products were thus accorded a high priority.

The extension of the war in the Pacific in the early part of 1942 brought other developments. Supplies available to the United Kingdom were further curtailed resulting in an increased demand upon countries, including Canada, that were more accessible. The new developments on the war front also changed the domestic position very appreciably, by eliminating or greatly reducing the supplies of many products that Canadians were normally dependent upon. The significance of this development can be appreciated when it is realized that domestic consumption, by 1942, had increased very considerably. A greatly expanded war effort, particularly in the realm of industrial production, had contributed to a marked increase in national income, in consumer purchasing power and in demand for food, particularly the protective foods.

The developments referred to in so far as they affected the needs of the United Kingdom and her increased dependence upon Canada, resulted not only in requests for more of the products already going forward but also for a greater variety of products. Eggs, fruits, vegetables, and other products were added to the list.

This situation called for marked changes in the organization of Canadian agriculture. Efforts were directed toward increasing the output of products in urgent demand, particularly live stock products. With an abundance of wheat on hand steps were taken to divert land from wheat to other crops. On the other hand, the acreage in feed grains and forage crops was expanded. So, too, was the acreage in flax for both oil and fibre production. Some oil-bearing crops—rape seed and sunflowers—were added to the Canadian production program and the output of soybeans was increased. The production of seed was encouraged and the acreage devoted to fruits and vegetables enlarged. Special efforts were made to expand the production of dried beans and peas.

ORGANIZATION FOR WAR EFFORT

The responsibility for direction of Canada's wartime agricultural program was vested in the Department of Agriculture. To the existing machinery of the Department there were added several additional agencies. These in the order of their establishment were—the Agricultural Supplies Board, The Meat Board, The Dairy Products Board, The Special Products Board, The Agricultural Food Board. These Boards are manned by senior officials of the Department of Agriculture and in the case of the Meat and Dairy Products boards, by persons other than civil servants familiar with the production and marketing of the products handled. Through these agencies and the existing facilities of the Department production policies were developed and put into effect. Through them, too, the trade was organized and the various products acquired and moved into export channels to meet the requests of the United Kingdom and Allied countries.

To deal with prices and distribution in general, and to protect the interests of the public as a whole the government, at the outbreak of war, established an agency known as the Wartime Prices and Trade Board. This body was entrusted with the responsibility of maintaining stability in the national economy and of preventing the undesirable developments that occurred during World War I. To the extent that the activities of the Board affect agriculture they have been co-ordinated with efforts of the various organizations in the Department of Agriculture. To increase the effectiveness of liaison, various administrators, with dual responsibility—to agriculture and in the field of production, and to the Prices Board in matters of price control—were jointly appointed.

The various Boards that were created and the activities conducted by them, including price and subsidy programs that will be discussed later, were established or undertaken under the authority of the War Measures Act.

With the organization of the Combined Food Board at Washington in 1942, a Food Requirements Committee was named by the Canadian Government to work with the Board. This committee co-ordinates Canada's undertakings to the maintenance of price ceiling, the provision of foods for domestic consumption and other factors. The allocations approved by the Committee are made effective on the authority of the Departments represented on it.

INTRODUCTION OF NEW POLICIES

The organization and direction of Canada's war effort was encouraged by the introduction of a variety of government policies. One of the first of these related to the apple industry. In this instance the loss of markets for a substantial part of the crop required immediate action. That action resulted in certain guarantees and in the development of a by-product industry and merchandizing program.

Reference has already been made to the curtailment of certain supplies, such as seeds, fertilizer, and insecticides normally obtained from other countries. When this occurred—in fact before it materialized in most instances—policies were introduced and organization effected through the Agricultural Supplies Board and the Administrators concerned, which resulted either in the development of domestic production or in the securing of new sources of supply in Allied or neutral countries. This in the case of seeds, for example, necessitated government guarantees and active organization on the part of the production service. In the case of fertilizers it meant the payment of subventions to encourage production and use.

Many other policies or measures were adopted to direct efforts into desired channels and to bring forth the kind and volume of products required. When requests for flax fibre were received production was organized and the acquisition of processing machinery by interested groups facilitated. When dehydrated fruits and vegetables were needed additional experimental work was undertaken and equipment acquired for the use of organizations engaged in commercial production. When the shortage of space for the shipment of eggs compelled the industry to resort to the production of egg powder the conversion was brought about with government assistance and with concessions in taxation to offset depreciation on plant and equipment.

Perhaps the most important single undertaking of the government in bringing about necessary adjustments in agriculture was that involved in reducing the acreage seeded to wheat. In this instance substantial payments were made to farmers to encourage diversion to feed grains, forage crops and fallow. Allied to this program in its contribution to increased live stock production was the policy of paying freight charges on feed grain shipped to the eastern provinces and British Columbia.

When it became possible in 1942, to map an over all production program, objectives or goals were established for all farm products. This was done with the aid of provincial governments and farm organizations.

Price Policy.—It was recognized at the outbreak of war that the prices of farm products were out of line with the prices of other commodities. Accordingly little or no effort was made to prevent such prices increasing during the early part of the war. By the early fall of 1941, however, the movement of prices and costs in general gave evidence of a much more serious inflationary trend. As a result ceilings were imposed, effective December 1, 1941, on the prices of most commodities and on services and rents. Even at that time, however, certain agricultural products, notably fresh fruits and vegetables, were exempted from the freezing order though many of these were later included. As a result of this delayed application of ceilings and certain adjustments subsequently made the index of the prices of farm

products as a group continued to rise throughout 1942 and much of 1943.

Subsidy Program.—With price control and stabilization the central feature of Canada's wartime economy it became necessary to provide an alternative for price increases when unavoidable additions to cost were experienced, or when an increase in income was necessary to direct production into desired channels. The device resorted to was the payment of subsidies.

Subsidies in one form or another have played a part in the agricultural program since early in the war but they became a more important factor when ceilings were applied to prices. This was particularly true in the case of dairy products where changes in domestic and overseas demands made changes in the production of specific products necessary. Increased costs had come about largely through higher wages for farm help. These wages were not controlled. Other factors such as crop failure with the additional expense of buying feed that necessarily follows such experiences, made the payment of subsidies essential.

Farm Labour and Machinery

Prior to the war there was a surplus of labour on Canadian farms. The requirements of the armed forces and the demands of a rapidly growing war industry drew off in 1940 and 1941, not only the surplus but an additional number of workers that threatened farm production. To meet the situation the government, early in 1942, exempted farm workers from compulsory military service and restricted the movement to other civilian occupations. This was supplemented by an active program to recruit and distribute labour, undertaken by National Selective Service in co-operation with provincial governments.

The situation as regards machinery was similar to that of labour. The needs of industry restricted the use of materials for the manufacture of farm machinery. The situation was partially met, however, by a system of allocations and by concentration on the production of equipment that would contribute most to the solution of the labour problem. In order to insure the continued operation of available equipment on farms the manufacture of replacement parts was increased.

Co-ordination of Wartime Program

In the conduct of the wartime agricultural program the same measure of co-operation between the Dominion and the provinces that characterized peace time activities has prevailed. Some twelve special Dominion-Provincial Conferences of agricultural officials were held. Several of these were convened to develop and agree upon agricultural objectives. At many of these conferences, including the latter, officials of farm organizations were present. A great many other meetings were held for the consideration of the various policies and programs as they were developed.

A feature of wartime policy has been the addition of special advisory committees. One of these, the Agricultural Advisory Committee, composed of representatives of the Federation of Agriculture and the provincial Departments of Agriculture meets periodically to consider agricultural needs and policies and to advise the Dominion Minister of Agriculture in such matters.

The Agricultural Food Board, which since early in 1943 has acted as a co-ordinating body with respect to the Dominion's agricultural program, has conducted the subsidy program under its administration with the

assistance of Provincial Milk Control Boards and the Dairy Commissioners of the provinces. With reference to subsidies on other products, policies were developed in consultation with representatives of the provincial Departments of Agriculture and of the farm organizations and trade—private and co-operative.

The Agricultural Supplies Board has worked with provincial government officials, with private organizations and with advisory committees representative of producer and trade organizations. While this Board is responsible for the development of programs in connection with production needs arising out of wartime developments the carrying out of such programs in so far as they affect farmers has been conducted through the regular services of the Dominion Department of Agriculture and with assistance of provincial departments, colleges, farm organizations and other bodies.

To make this wartime program effective and to achieve maximum provincial effort in the matter of food production, the various provinces exercised their concurrent authority by establishing provincial machinery to insure the fullest measure of co-operation and support.

The Farm Labour Program, supervised by National Selective Service, was put into force under joint Dominion-Provincial committees. The control of the supplies of machinery, while distinctly a Dominion government function, was facilitated by co-operative arrangements with provincial authorities and with the aid of an advisory committee representative of both Dominion and provincial officials.

9. OTHER MARKETING ACTIVITIES

WHEAT MARKETING ACTIVITIES

Board of Grain Commissioners

As early as 1874, seven years after Confederation, the Dominion Parliament passed the General Inspection Act which regulated the grain trade in a large variety of staple commodities. Before Confederation, the grain trade had been subject to a measure of control under enactments of the local legislature; but the General Inspection Act of 1874 was the first measure of the kind applicable to the whole of the new Dominion. Under this Act the different brands of flour and meal were legally defined, and special provisions were applied to the grading of grain. When the grain-growing industry had become established in Manitoba, an Act of 1885 amending the General Inspection Act of 1874 considerably extended the grades of grain, and for the first time introduced grades descriptive of the hard wheats of Manitoba and of what were then known as the North-West Territories. After this came the Manitoba Grain Act of 1900, under which the previous legislation, with amendments, relating to the warehousing and transportation of grain, became merged. The Inspection Act, however, still covered the inspection, grading and weighing of grain; but in 1904 all matters affecting grain were withdrawn from that Act and were transferred to the Grain Inspection Act of that year. On the general revision of the Statutes in 1906 the provisions of the Grain Inspection Act of 1904 became Part II of the Inspection and Sale Act.

The Canada Grain Act was passed in 1912, which, with amending Acts since passed, is the measure that regulates the operations of the Canadian grain trade. The Act codified all the previously existing enactments

of the Dominion Parliament that were in force as controlling the grain trade, and also included numerous additional provisions of important character. Amongst these was the provision for appointment by Order in Council of a Board of three Commissioners, who became known officially as "The Board of Grain Commissioners for Canada". The Board was created as a semi-judicial and administrative body to administer the Act. The Board at present consists of three commissioners and four assistant commissioners. In addition to the executive offices, which include the secretary with clerical staff, the License and Bonding and Statistics Branches, the organization comprises the Inspection, Weighing and Registration Branches, the management of the Canadian Government Elevators, the Grain Appeal Tribunals to decide on appeals from decisions of grain inspecting officers, Committees on Grain Standards to settle standards for the different grades of grain in the Eastern and Western divisions, and the Grain Research Laboratory.

In addition to regular routine administration work the Board provides the following services for the grain growers and marketing organizations in Canada:

- (1) inspection and weighing of grain—all grain passing through an inspection point must be graded, and a grade certificate issued. Grain shipped out of a terminal must be inspected and a final certificate issued. Government weighmen at all terminal elevators and most mill elevators in both Eastern and Western Canada weigh all grain moving in and out of these elevators;
- (2) licensing and bonding of dealers in the grain trade—to protect the grain producer and grain handling organization all grain dealers, elevator companies, and commission merchants have to secure a licence from the Licensing and Bonding Branch. Before a licence is issued the licensee must deposit with the Warehouseman a bond payable to the Board, sufficient to cover the amount involved in their operations.
- (3) registration of warehouse receipts—all warehouse receipts must be registered, and must be represented at all times by stocks of grain in the elevators;
- (4) gathering and publication of grain statistics—statistics are important in regard to production, consumption, export trade and carry-over as they influence the price of grain most;
- (5) grain research—the Government has its own laboratory to test the quality of Canadian grain. The laboratory at Winnipeg acts in an advisory capacity to the Board, conducts investigations to determine the value of the different grades and varieties of grain, and investigates problems connected with grading, transportation and storage, moisture content and other problems peculiar to grain;
- (6) regulation of the distribution of empty grain cars—this provides for an equitable distribution of cars among the shippers;
- (7) provision for public storage of grain—to provide storage at interior and terminal points the Government have erected or acquired large storage elevators;
- (8) investigation and settlement of disputes between the producers and the grain trade, and between different organizations within the trade—complaints of improper handling of grain and unfair dealings can be dealt with by the Board, but it has no jurisdiction to deal with complaints about prices and price spreads.

The Board of Grain Commissioners administers the Inland Water Freight Rates Act. It is also charged with the administration of The Grain Futures Act, 1939. The provisions of this Act, however, had not been put into force at January 1, 1941. Under the Prairie Farm Assistance Act of 1939 the Board collects from producers in the three Prairie Provinces and the Peace River District of British Columbia one per centum of the purchase price on all Western wheat, oats, barley and rye sold to licensees under the Canada Grain Act. Under the provisions of Order in Council P.C. 10229, of November 19, 1942, the Board collects the levy for War Risk Insurance on grain.

The Canadian Wheat Board

The origin of the present Canadian Wheat Board can be traced back to the Board of Grain Supervisors established by Order in Council on June 11, 1917. This Board was set up when it became evident that the open market could no longer function satisfactorily in view of the growing importance of centralized wheat buying on the part of the Allied Governments. Control was deemed necessary to prevent "to the utmost possible extent any undue inflation or depreciation of values by speculation, by the hoarding of grain supplies, or by other means." The Board of Grain Supervisors assumed the role of monopolist seller in respect to all wheat produced in Canada, acting as the intermediary between the farmers and the Wheat Export Company, the agency making purchases on behalf of the Allied Governments. Trading in wheat futures was suspended on the Winnipeg Grain Exchange from September 1, 1917, to July 21, 1919. Futures trading was again resumed for a mere ten days; then on July 31, 1919, the Canadian Wheat Board was appointed by Order in Council and assigned the task of disposing of the remainder of the 1918 crop as well as the entire 1919 crop. Whereas the 1917 Board had been established because the open market was not regarded as competent to cope with centralized buying, the 1919 Board was set up because it appeared that in 1919-20 there would exist neither this centralized buying nor any open market of the pre-war type. Furthermore, unlike the Board of Grain Supervisors which paid the producer a fixed and final price for his wheat, the Canadian Wheat Board paid an advance to the producer and gave him participation certificates entitling him to his proportionate share of any surplus above the initial price. The Wheat Board ceased functioning in 1920, and the open-market system was resumed.

Following the withdrawal of the Federal Government from direct marketing operations, the 'twenties were characterized by the growth of co-operative marketing agencies. The Alberta Co-operative Wheat Producers Limited commenced operating in 1923, followed by the Saskatchewan and Manitoba Wheat Pool organizations in 1924. In 1924 the three Provincial Pools co-operated to form a Central Selling Agency known as the Canadian Co-operative Wheat Producers Limited. When the pools became entangled in financial difficulties in

1929 and 1930 with the advent of a period of falling prices, the Federal Government once again intervened in the marketing of wheat. It gave the chartered banks guarantees in respect to the advances they had made to the pools. The Dominion Government attempted to meet the emergency by initiating marketing stabilization measures through the medium of the Central Selling Agency. These measures amounted to the holding of cash grain and the purchasing of futures at times when such was deemed advisable in the interests of stabilization, and, although they were of an avowed "temporary" nature, they were continued over the period 1930-35.

Provision was made for stabilization measures of a permanent character in 1935 when the Dominion Parliament passed "The Canadian Wheat Board Act." The Act provided for the appointment by the Governor-in-Council of a Board of three members, under the Minister of Trade and Commerce, with headquarters at Winnipeg.

By section 8 the Board was empowered "to sell and dispose of from time to time all wheat which the Board may acquire, for such price as it may consider reasonable, with the object of promoting the sale and use of Canadian wheat in world markets." The Act did not require every farmer to sell his wheat to the Board; rather it merely required the Board to purchase all wheat offered to it at a fixed initial advance, accompanied by the issue of participation certificates. If he so desired, the farmer was perfectly free to make delivery on the open market.

In marketing its stocks the Board is required to utilize existing marketing agencies, but if any such agencies are not operating satisfactorily the Board may institute its own. The Canadian Wheat Board submits a monthly report to the Minister of Trade and Commerce, showing its purchases and sales, wheat stocks and contracts on hand, and its general financial position.

The initial advance for the 1935-36 crop year was fixed at 87½ cents, basis in store Fort William/Port Arthur. In the 1936-37 and 1937-38 crop years the Board was exempted from taking deliveries from producers because the open market price did not fall below 90 cents. For the 1938-39 crop year the initial advance was fixed at 80 cents and producer deliveries were taken.

During the 1939 session of parliament, several significant amendments were made to The Canadian Wheat Board Act. The fixed initial price payable by the Board was established at 70 cents for Number One Northern, at either Fort William/Port Arthur or Vancouver; hitherto, the determination of the initial price was left to the Board, subject to the approval of the Governor in Council. An amendment was also passed limiting the Board to purchasing 5,000 bushels of wheat from any one producer in any one crop year; hitherto, the Board could purchase unlimited quantities from any producer. Finally, the jurisdiction of the Board was extended to embrace all of Canada; hitherto, its operations were confined to the marketing of wheat produced in the four Western Provinces.

At the outbreak of war, the Board's European Commissioner assumed a role entirely different from that of promoting the demand for Canadian wheat, namely, that of acting as liaison officer between the Canadian Wheat Board and the Cereals Control Board, the Cereals Purchasing Committee and the Ministry of Food in Great Britain.

In 1940 the Canadian Wheat Board Act was further amended to meet special wartime conditions. The

5,000 bushel limitation on deliveries to the Board was removed; provision was made for storage payments on farm stored wheat at a rate not greater than the established country elevator tariff rate; the Board was given power to regulate deliveries by producers at country, mill, and terminal elevators and loading platforms, not only of wheat but of all types of grain; finally, provision was made for the restoration of an Advisory Committee to assist the Board, this time a body of eleven members (as compared with seven on the original Advisory Committee). In order to meet the difficulties in marketing the 1940 crop arising out of a shortage of storage space, the Board drafted regulations which were approved by Order in Council on August 7, 1940, providing that a producer could not make deliveries of any wheat, oats or barley without first securing a permit from the Canadian Wheat Board. The actual issuing of these permits was handled by the elevator agents. The Board then instituted a delivery quota system in respect of wheat and the coarse grains in accordance with the authority granted by the 1940 amendment to the Canadian Wheat Board Act, so as not to overtax storage facilities. The initial quota was announced on August 7, at 5 bushels per seeded acre of wheat, oats, and barley, not inter-changeable. These quotas were raised as the season advanced.

The Wheat Board again employed the quota delivery system in marketing the 1941-42 crop of wheat, but in view of the small harvest in coarse grains unrestricted deliveries were permitted in the case of oats, barley, rye, and flaxseed. The initial wheat delivery quota was set at five bushels per "authorized" acre; the authorized acreage of an individual producer was computed on the basis of 65 per cent of his declared wheat acreage in 1940.

In March, 1942, the Wheat Board was given special wartime powers by the Governor General in Council to an ample supply of flaxseed to meet wartime demands. The Board received authority to expropriate all flaxseed in storage in Canada and was charged with the responsibility of handling all flaxseed delivered by producers. Trading in flaxseed futures and cash flaxseed was suspended on any grain exchange, or elsewhere, in Canada, and a fixed price was paid to producers delivering flaxseed.

In marketing the 1942-43 crop and the crops of the next two years, the Wheat Board again used the delivery quota system. Quotas established were flexible and were raised as elevator space became available.

The fixed initial price of wheat was increased on August 1, 1942, for the first time since August 1, 1939, from 70 cents to 90 cents per bushel basis Number One Northern in store Fort William/Port Arthur or Vancouver, in accordance with an amendment to "The Canadian Wheat Board Act, 1935," assented to March 27, 1942.

Throughout the 1942-43 season the Board was empowered to purchase oats and barley at minimum prices prescribed by the Governor General in Council. The Wheat Board also acted as the Wartime Prices and Trade Board's administrator of ceiling prices on coarse grains. These activities have been maintained during the crop years 1943-44 and 1944-45.

The Wheat Board was designated as the only agency to receive flaxseed from producers in Canada for the crop years 1942-43 to 1944-45. The board was given authority to purchase soybeans at a prescribed price in

the Eastern Division. Soybeans were sold at the purchase price, the Board assuming carrying charges and administrative expenses.

During the 1943-44 crop year, the Board purchased sunflower seed and rapeseed from producers basis the guaranteed price. In accordance with arrangements with the Vegetable Oils Controller, Board purchases were resold at the purchase price, the Board assuming carrying charges, all transportation costs of delivery to the Board, and costs involved in maintaining its holdings in proper condition until final distribution.

An additional duty was assigned the Board when the prices of oats and barley in the export market (chiefly the U.S.A.) came to exceed the domestic ceiling prices. The Federal Government established equalization funds in April, 1943, and bestowed responsibility for their administration upon the Board. Equalization fees were levied on permits issued for the export of oats and barley, the fee being based upon the difference between domestic and export prices, after allowing for transportation costs, normal forwarding costs, and import duties. The revenue subsequently raised, less expenses, was then distributed after the close of the crop year among all producers who marketed oats and barley during the time the fund functioned. This scheme remained in effect during the crop years 1943-44 and 1944-45.

The Board was charged with the administration of drawbacks in respect to flour and other human foods containing wheat sold and delivered in Canada.

In the field of domestic wheat policy, the suspension of trading on the Winnipeg Wheat Futures market, and the establishing of a new fixed initial price at the close of business on September 27, 1943, were the outstanding developments of the crop year 1943-44.

On September 27, 1943, the Dominion Government announced an important change in wheat policy. The new policy involved the following actions:

- (1) The discontinuance of trading in wheat futures on the Winnipeg Grain Exchange;
- (2) The acquisition by the Board, on behalf of the Dominion Government, of all stocks of unsold cash wheat in Canada on the basis of the closing prices on September 27, 1943;
- (3) The raising of the fixed initial price from 90 cents per bushel to \$1.25 per bushel for Number One Northern wheat basis in store Fort William/Port Arthur or Vancouver;
- (4) The closing out of the 1940-41, 1941-42 and 1942-43 Wheat Board Crop Accounts on basis of closing market prices on September 27, 1943;
- (5) The use of Government-owned wheat to meet requirements under Mutual Aid and to provide wheat for subsidized domestic purchasers.

This program was made effective until July 31, 1945.

SUPPORT OF AGRICULTURAL PRICES

At the 1944 Session of the Parliament of Canada, legislation described as "An Act for the Support of the Prices of Agricultural Products during the Transition from War to Peace" was passed. The Act provides for the creation of an Agricultural Prices Support Board

and assigns to the Board the authority (a) "to prescribe from time to time, with the approval of the Governor in Council, prices at which the Board may purchase agricultural products in the market"; (b) "to purchase at such prices any agricultural product, if such product on inspection meets standards as to grade and quality prescribed by or under any Act of the Parliament of Canada . . ."; (c) "to pay to the producers of an agricultural product directly or through such agent as the Board may determine the difference between a price prescribed by the Board with the approval of the Governor in Council for such product and the average price, as determined by the Board, at which such product is sold in the market during a specified period if such average price is below such prescribed price"; (d) "to sell or otherwise dispose of any agricultural product purchased by the Board."

Other powers granted the Board include authority to enter into contracts, to appoint agents, Commodity Boards and advisory committees, and to act as the agent for the Canadian Government in connection with any contract between the Government of Canada and any other Government or agency thereof; also to act as purchasing agent in respect of any agricultural product for any department of the Government of Canada.

In prescribing prices under paragraphs (a) and (c) above "the Board shall endeavour to ensure adequate and stable returns for agriculture by promoting orderly adjustment from war to peace conditions and shall endeavour to secure a fair relationship between the returns from agriculture and those from other occupations".

"Agricultural product" is defined as "any natural product of agriculture except wheat, designated by the Governor in Council, and includes processed meat, dairy and poultry products if so designated". Wheat is excluded from this Act for the reason that it is already dealt with under other legislation.

Working capital of \$200,000,000 is provided by the Act. Any profit on the operations of the Board is to be deposited to the credit of the Consolidated Revenue fund and any loss is to be recouped from moneys appropriated by Parliament.

The section of the Act containing the powers outlined above is to come into force on a date to be fixed, and remain in force for such period as may be determined by proclamation of the Governor in Council published in the *Canada Gazette*. The prices of agricultural products are now being supported by the existence of export contracts and by the payment of subsidies under authority of the War Measures Act.

PROVINCIAL GENERAL MARKET CONTROL¹

Nova Scotia.—A Nova Scotia Apple Marketing Board was established in 1935 with the approval of the Minister of Agriculture for Nova Scotia and under the authority of the Natural Products Marketing (Canada) Act. The board consisted of 5 members—three elected by the growers and two elected by the shippers, and made its headquarters at Kentville. The board was entrusted with wide powers, including the following:

- (1) regulation of the time and place and the manner in which apples were marketed;

¹ Provincial control over the marketing of fluid milk is dealt with in the next section.

- (2) designation of a marketing agency of three persons to have the exclusive right to market the entire apple crop, provided all bona fide shippers be appointed as sub-agents;
- (3) the licensing of all producers;
- (4) the imposition of tolls to defray the costs of the board's operation.

The Nova Scotia Apple Marketing Board passed out of existence when its constitutional basis—the Natural Products Marketing (Canada) Act—was declared to be invalid by the Supreme Court of Canada and subsequently by the Judicial Committee of the Privy Council.

Under the emergency conditions that developed with the outbreak of war in 1939 centralized control of marketing was considered necessary and at the request of those concerned in the province a Board was established under the authority of the Dominion War Measures Act. This body has had control over the marketing of Nova Scotia apples during the war years and has acted as the instrument through which Dominion government assistance to the industry in Nova Scotia has been made available.

New Brunswick.—On March 27, 1934, the legislature of New Brunswick passed "The New Brunswick Marketing Act", which led to the formation of The New Brunswick Marketing Board. The Board, consisting of from one to three members appointed by the Lieutenant-Governor in Council, was given the following powers:

- (1) power to investigate and make a general survey of the status of the agricultural, lumbering, fishing, and other natural products industries of New Brunswick;
- (2) power to recommend and encourage the adaptation of the best marketing, distributing, and transportation facilities for any class of natural products and the by-products thereof;
- (3) power to promote in general the better marketing of the natural products of New Brunswick;
- (4) power to recommend to the Premier the establishment of sub-committees to facilitate the marketing of any particular natural product or by-product.

The Board's costs of operation were defrayed by the Department of Agriculture and the Department of Lands and Mines out of a special appropriation made by the Legislature.

The Natural Products Control Board.—The Natural Products Control Board of New Brunswick was established in 1937 in accordance with the provisions of "The Natural Products Control Act." The Board is a body corporate, acting in close co-operation with the Minister of Agriculture. It consists of from one to three persons as appointed by the Governor in Council. In its own right, the Board has authority to investigate any matter relating to the marketing of natural products (e.g., cost of production, trade practice, grading, price-spreads), to arbitrate or settle any dispute arising between producers, processors, distributors, or transporters of natural products, and to establish local boards for facilitating the marketing of any particular natural product. Subject to the approval of the Governor in Council the Board is empowered to require all persons engaged in the marketing or processing of natural pro-

ducts to secure licences and to regulate in general the marketing of natural products within the Province.

"The Natural Products Control Act" provides in section 7 that "where the Board receives from any group of persons engaged in the marketing of natural products, a petition asking that any scheme or plan for the marketing or regulation of such natural product be adopted, the Board may, if it is of the opinion that such group of persons is fairly representative of the persons engaged in the phase of marketing represented by such group, recommend the adoption of such scheme or plan to the Minister."

Under this provision, a number of local Boards were set up. In July, 1939, a local board concerned with the marketing of cheese—the New Brunswick Cheese Board—was constituted. Functioning under the supervision of the Natural Products Control Board, this local board consists of one representative from each of New Brunswick's 12 cheese factories as elected annually at a meeting of the patrons and shareholders of each plant. The Natural Products Control Board authorizes the Cheese Board as its agent, to execute various functions essential to the control and marketing of cheese, including the designation of the agency through which the marketing shall be carried out, and the fixing, from time to time, of the price at which any cheese of a given quantity or quality may be sold within the Province. The Cheese Board is empowered to levy a toll not exceeding one-fifth of a cent on every pound of cheese marketed under its control.

Ontario

Farm Products Control Board.—The Farm Products Control Board of Ontario was set up in 1937 by "The Farm Products Control Act" to establish and supervise the operation of local boards for regulating the marketing of designated farm products. The Board, whose membership comprises the members of the Milk Control Board and the Commissioner of Marketing, possesses the authority to recommend the establishment (or the revocation) of a marketing scheme following the taking of a poll among the producers concerned. Local boards established under the central Board's authority are empowered to impose licensing requirements, to negotiate minimum prices, to determine the practices which shall prevail in distributing the product concerned.

The following eight local boards had been established under authority of the Farm Products Control Act down to March 31, 1943: *The Ontario Cheese Producers' Marketing Board*—All cheese sold in Ontario is marketed by local boards operating under the Ontario Cheese Producers' Marketing Board in accordance with uniform rules and regulations. A charge of 5c. per 100 pounds is levied to defray the necessary expenses.

The Ontario Peach Growers' Marketing Board.—This Board administers the marketing of peaches designated for processing; peaches for the wholesale and retail fresh fruit trade are exempt from its jurisdiction. The Ontario Asparagus Growers' Marketing Board—This Board regulates the marketing of asparagus for processing. Established in 1937 it first operated in 1938. The Board brings together equal numbers of growers and processors; this committee then negotiates a uniform price for all sales. Where no agreement can be reached, the Board then exercises its powers of arbitration. This is the general procedure followed in respect to all the various commodity boards.

The Ontario Pear, Plum, and Cherry Growers' Marketing Board.—This Board deals with pears, plums, and cherries intended for processing. It was established in 1938.

The Ontario Strawberry Growers' Marketing Board.—This Board was set up in April, 1942, in response to persistent requests from producers. Strawberries for the wholesale and retail fresh fruit trade are exempt from the scheme.

The Ontario Seed Corn Growers' Marketing Board.—This Board was established in March, 1942. Through negotiations between producers and purchasers, under the Board's supervision, a scale of premiums—rather than a price—for the different varieties of registered hybrid and open pollinated seed corn to be paid over and above the prevailing January market prices for dried commercial corn was set up.

The Ontario Sugar Beet Growers' Marketing Board.—This Board came into existence in March, 1942. The Negotiating Committee provided for in the scheme met, but failed to reach any agreement. The Board therefore decreed a minimum price at which the 1942 crop was marketed.

The Ontario Tomato Growers' Marketing Board.—This Board was established in 1940. A negotiating committee of three growers and three processors operates under the Board. In 1942, 157,733 tons of tomatoes for processing were sold under terms fixed by the committee.

British Columbia.—The province first intervened in marketing operations in British Columbia in 1927 when "The Produce Marketing Act" was passed following the failure to secure orderly marketing of fruit through voluntary co-operation. A controlling committee, called the Committee of Direction, was set up with power to impose levies on all producers so as to create an equalization fund and establish a minimum price. In 1929, pursuant to the recommendations of a Royal Commission appointed to investigate the milk industry of the Lower Mainland, the "Dairy Products Sales Adjustment Act" was passed. This legislation also established a Committee of Direction charged with the task of giving all producers a uniform price for both fluid milk and manufactured milk products in the Fraser Valley. Both these pieces of legislation, however, were subsequently declared to be *ultra vires*—"The Produce Marketing Act" on the ground that it involved inter provincial trade; and "The Dairy Products Sales Adjustment Act" on the ground that the levies imposed on milk producers were in effect indirect taxes.

The next concerted attempt to regulate marketing operations in British Columbia was made in 1934 with the enactment of the "Natural Products Marketing (B.C.) Act." This Act provided for provincial co-operation with the Dominion Government in regard to matters within provincial jurisdiction. It substituted licensing procedure for the levy provisions of the earlier legislation, so as not to prejudice its constitutionality. The Act was attacked in the courts, but its validity was upheld. The scope of the Act is limited to products sold wholly within British Columbia. The most significant section of the legislation—section 4—states that the Lieutenant Governor in Council may

"establish, amend and revoke schemes for the control and regulation within the province of the transportation, packing, storage, and marketing of any natural product, and may constitute marketing boards to administer such schemes, and may vest in those boards, respectively, any powers considered necessary or advisable to enable them effectively to control and regulate the transportation, packing, storage, and marketing of any natural product within the province, and to prohibit such transportation, packing, storage, and marketing, in whole or in part."

Under this authority the following eight boards, each charged with the administration of a particular scheme, were established:—

British Columbia Coast Vegetable Marketing Board.—This Board regulates the marketing of vegetables other than hothouse tomatoes, cucumbers, and rhubarb in the area comprising the Lower Mainland, designated as district Number 1, and Vancouver Island and the Cariboo and Pemberton Meadows areas, collectively, designated as district No. 2.

British Columbia Interior Marketing Board.—The "Interior" Board carries out a function similar to that performed by the British Columbia Coast Vegetable Marketing Board in a different section of the Province. Unlike the Coast Board, the Interior Board operates through a grower-owned agency known as the Interior Vegetable Marketing Agency Limited.

British Columbia Fruit Board.—This Board regulates marketing within that part of the Province "lying south of the 51st parallel of north latitude and east of the 21st meridian of west longitude." This area is divided into 25 districts, in which some 2,600 fruit growers are located.

The disastrous market conditions of the early 1930's led to the organization among the growers themselves of two Boards: the Okanagan Stabilization Board and the Growers' Stabilization Committee. These two institutions had as an objective the formation of the United Fruit Growers' Association, which would constitute a selling agency embracing all growers. With the passing of the Dominion Natural Products Marketing Act in July, 1934, these two organizations were dissolved and the British Columbia Tree Fruit Board established. When the Federal Act was declared to be *ultra vires* in June, 1936, the members of the British Columbia Tree Fruit Board met the crisis by forming a company called British Columbia Tree Fruits Limited, which really took over the duties of the British Columbia Tree Fruit Board. During 1937 and 1938 British Columbia Tree Fruits Limited authorized each of its shipper members to market a certain percentage of his total pack of apples; when all shippers had reached this percentage, further releases were made, from time to time, until the end of the season. In this way, price-cutting designed to save storage charges was eliminated as each shipper had to store the same proportion of his crop. This policy received the endorsement of the growers at a convention held in January, 1939, and subsequently the principle of a single central selling agency was extended. Contracts were negotiated with all shippers whereby British Columbia Tree Fruits Limited became the sole selling agent for all Canadian markets.

Meanwhile the loss of authority resulting from the invalidation of the Natural Products Marketing Act (Dominion) which deprived the British Columbia Board of its regulatory powers over interprovincial and export sales—was restored by Order in Council under authority of the War Measures Act. The Board was given a virtual monopoly over the marketing of Okanagan apples. It was also empowered to operate a pool for the equalization of returns. Agreements have been negotiated from time to time during the war with the Federal Minister of Agriculture whereby the Dominion, in view of the pronounced reduction in export trade, agreed to purchase large quantities of apples at guaranteed prices from the British Columbia Fruit Board through its designated selling agency, British Columbia Tree Fruits Limited.

Lower Mainland Dairy Products Board.—This Board was established, not to conduct marketing operations, but rather to prescribe rules and regulations governing the distribution of milk and milk products in the metropolitan area of Greater Vancouver. The Board was given no authority to fix prices; the only power it was assigned in this respect was to fix the spread between the wholesale and retail price. The constitution of the Board resembled that of the other marketing boards.

The Halibut Marketing Board of British Columbia.—The Halibut Board was established to regulate the marketing of halibut caught in Pacific coastal waters. It consists of six members chosen annually by election among the fishing captains and producers, plus a chairman chosen by the other members of the Board.

British Columbia Salt Fish Board.—The Salt Fish Board was established in October, 1934, as a body of five members; two appointed annually by the Meat, Oil, and Salt Fish Section of the Canadian Manufacturers Association, British Columbia Division; two appointed annually by the Canadian Salt Herring Exporters Limited; and a chairman appointed by the Dominion Deputy Minister of Fisheries. The Board was assigned the responsibility of regulating the marketing of dry salt herring and dry salt salmon produced in British Columbia, almost all of which must be disposed of in the export market. The Board was given the power to regulate the time and place at which, and to designate the agencies through which, these products should be marketed, to require all packers and shippers to be licensed, and to conduct a pool for the equalization of returns.

The British Columbia Salt Fish Board operated until World War II closed off the markets in China and Japan upon which the trade in the products regulated was chiefly dependent.

British Columbia Hothouse Tomato and Cucumber Board.—This three-man Board, established in 1934 to regulate the marketing of hothouse tomatoes and cucumbers, operated in a manner similar to the other marketing boards, although apparently with less satisfaction to the producers concerned. As a result of an adverse vote of growers, the Board was disbanded in 1938.

The British Columbia Marketing Board.—This Board was established by section three of "The Natural Products Marketing (B.C.) Act, 1934" as a general body supervising the operation of the various commodity boards outlined above. The Board consists of three

members appointed by the Lieutenant-Governor in Council. As at present constituted, the British Columbia Marketing Board merely exercises a general advisory power and has no authority to enforce decisions which might conflict with those of the subordinate boards.

* * * * *

It is to be noted that the Boards described above were not set up solely under authority of the "Natural Products Marketing (B.C.) Act." "The Natural Products Marketing (Canada) Act" was also fundamental to their establishment. Indeed, the British Columbia marketing program in general represented a concerted effort at the co-ordination of Dominion-Provincial legislation to meet an unfavourable market situation. So as it existed in 1936, the program rested upon the two Natural Products Marketing Acts, federal and provincial. Hence, when in July, 1936, the Supreme Court of Canada gave an opinion that the Dominion Act was ultra vires, the continued existence of the various provincial marketing boards was threatened. Immediately the decision of the Supreme Court of Canada was known, the British Columbia legislature took action by passing the "Natural Products Marketing (B.C.) Act Amendment Act, 1936." This Act gave the various provincial marketing boards full authority to regulate all marketing operations in respect to natural products *within British Columbia*. As at present constituted marketing boards, such as the British Columbia Fruit Board, are regulating marketing outside the Province by virtue of powers bestowed upon them by the Dominion Government under the War Measures Act.

PROVINCIAL MARKET CONTROL OF FLUID MILK

All the provinces of Canada except British Columbia possess governmental agencies to control the purchase and sale of milk intended for consumption in fluid form.

Prince Edward Island.—In 1938 the "Prince Edward Island Milk and Cream Producers', Consumers' and Distributors' Protective Board" was established. The Board is composed of three persons, two members representing the consumers, the producers and distributors, and the third being the provincial Dairy Superintendent. The Board functions within the jurisdiction of the Department of Agriculture.

The powers of the Board include the following: the granting and revoking of licences to producers and distributors; inquiring into any matter relating to the production, transportation, processing, or distribution of fluid milk or cream upon the motion or complaint of three producers, consumers or distributors; arbitrating in disputes between any persons engaged in the industry; fixing of prices; defining the area or areas within Prince Edward Island to which control is applicable.

Nova Scotia.—"The Nova Scotia Milk and Cream Producers Protective Board," consisting of three members appointed by the Lieutenant-Governor in Council, was established in October, 1934. One of the purposes in setting up the Board was to put an end to the frequent failing of distributors to meet their accounts with producers, particularly in the Halifax area. Hence in providing for the licensing and bonding "any person, firm association or company engaged in buying from pro-

ducers fluid milk or cream for resale" the Act championed the protection of producers rather than the protection of consumers. The Board appears to have passed out of existence shortly after the submission of its first annual report to the Minister of Agriculture in 1935.

In 1938 "The Dairy Arbitration Act, 1938" provided for the establishment of "The Dairy Arbitration Commission of Nova Scotia," consisting of one or more members appointed by the Lieutenant-Governor in Council. Subject to the approval of the Lieutenant-Governor in Council, the Commission was empowered to arbitrate disputes arising between producers, consumers and distributors of milk, to prescribe price standards for milk, cream and butterfat, to prohibit distributors from terminating the purchase of milk from a producer, or distributors from terminating the sale of milk to a distributor, without just cause, unless 15 days' notice be given. No person was allowed to engage in any phase of the milk industry without at first obtaining a licence from the Commission.

In 1944 the regulative powers exercised by the Dairy Arbitration Commission were transferred to the Board of Commissioners of Public Utilities for Nova Scotia.

New Brunswick.—By "The Dairy Products Act" the New Brunswick Dairy Products Commission came into existence. The Commission consists of three members, one representing the producers, and functioning within the jurisdiction of the Department of Agriculture. The Commission fixes the price of milk and cream in any area constituted under the Act—no region is proclaimed to be an area unless two-thirds of the producers therein petition the Commission to have it included within its jurisdiction. The Commission supervises and regulates all operations pertaining to the production and distribution of milk and cream, including milk and cream intended for manufacture into butter, cheese, and other milk products, as well as that destined for human consumption in fluid form. It may approve certain price agreements entered into between producers and distributors and make agreements binding upon every person selling or buying milk or cream within the limits of the territory affected by the agreements.

Quebec.—The Quebec Dairy Industry Commission, consisting of from five to seven members appointed by the provincial Minister of Agriculture, was established in 1933, pursuant to the "Dairy Products Act." The Commission, acting under the supervision of the Minister of Agriculture, is entrusted with the following powers: continuous investigation into the dairy industry and the dairy products trade in Quebec and elsewhere; regulation of all phases of the marketing of milk and cream, including the fixing of minimum prices; to approve or annul agreements entered into between producers and dealers or distributors respecting the sale of milk and cream; supervision of the activities of the inspectors appointed under the Dairy Products' Act.

Ontario.—The passing of "The Milk Control Act" of Ontario in 1935 resulted in the establishment of the Ontario Milk Control Board. The Board, comprised of one or more members appointed by the Lieutenant-Governor in Council, functions as a branch of the Department of Agriculture. The Board performs a number of duties: it issues and revokes licences to per-

sons engaged in any phase of the marketing of milk; inquires into matters relating to the production, transportation, processing, distribution and sale of milk; arbitrates disputes between any two or more classes of persons engaged in the milk industry; prohibits any price cutting operations in respect to milk and cream; prohibits milk distributors from compelling or including producers to invest money in a dairy plant or other equipment in order that such producers may obtain or retain a market for their milk; prohibits milk distributors from terminating the purchase of milk from a producer without just cause; issues regulations governing the milk industry in general, including the prescribing of the terms and conditions upon which milk may be received, handled, transported, stored, processed, kept for sale, or sold.

Manitoba.—From 1932 to 1937 the marketing of fluid milk in the Greater Winnipeg area was regulated by the Municipal and Public Utilities Board of Manitoba in accordance with an amending act passed in May, 1932. In 1937 a separate agency for the control of milk marketing was appointed pursuant to "The Milk Control Act, 1937." The Milk Control Board of Manitoba is a body corporate, consisting of three members appointed by the Lieutenant-Governor in Council; it is required to submit an annual report to the Minister of Agriculture and Immigration. The Board performs functions similar to those discharged by the Milk Control Board of Ontario; unlike the Ontario Board, however, its jurisdiction is limited to those parts of the province which it designates as "areas" and not to the province as a whole.

Saskatchewan.—The Milk Control Board of Saskatchewan was established in 1935 under authority of "The Milk Control Act." The Board, consisting of one or more members, as determined from time to time by the Lieutenant-Governor in Council, is a body corporate responsible directly to the Premier. The Board regulates the conditions under which milk is produced and distributed, including the fixing of price schedules for the various phases of the industry. Like its counterpart in Manitoba, the authority of the Saskatchewan Milk Control Board only applies to those parts of the province which it has designated as "areas."

Alberta.—Pursuant to an amendment to "The Public Utilities Act, 1923," passed by the Alberta legislature in 1933, the powers of the Board of Public Utility Commissioners were extended to include the regulation of the production and distribution of milk. There is no separate Milk Control Board as such in Alberta. In relation to milk, however, the Board of Public Utility Commissioners performs the same functions as the Milk Control Boards of the other provinces, including the licensing of all persons engaged in the industry and the setting of minimum prices. As in the other Prairie Provinces, its regulations only apply to those regions it designates as "areas."

"The Board of Public Utility Commissioners" consists of three members appointed by the Lieutenant-Governor in Council to hold office for ten years, subject to removal by the Lieutenant-Governor on address of the Legislative Assembly. The Board is "a body corporate with perpetual succession and a common seal;" it is required to submit an annual report on its operations to the Premier.

British Columbia.—British Columbia is the only province not having an agency charged with the responsibility of controlling the operation of the fluid milk industry. Various attempts have been made to obtain a measure of control but none has so far been effective.

For the duration of the war, all provincial milk agencies are performing a special additional function in interpreting the regulations of the Wartime Prices and Trade Board to members of the milk industry, and in interpreting the interests of the milk producers and distributors to the Prices Board. Authority with respect to prices now rests in the Wartime Prices and Trade Board but this body works with the provincial milk control agencies in this, as in other matters.

10. SPECIAL ACTIVITIES

WHEAT ACREAGE REDUCTION PROGRAM

The Wheat Acreage Reduction Program was introduced as a measure to meet the crisis rising out of a loss of export markets for wheat due to World War II, and to divert wheat acreage to more immediately useful purposes. The effect of the decrease in marketing was first felt in 1940. With the exhaustion of almost all available space following the storing of the 1940-41 crop, the Federal Government decided to restrict deliveries to a total of 230,000,000 bushels of wheat for the crop year 1941-42. A system of delivery quotas was adopted to ensure that every farmer was given a fair opportunity to market a portion of his crop. In order to compensate wheat producers for the loss of cash income rising out of their inability to make usual deliveries, the Dominion inaugurated a scheme designed to reduce wheat production and at the same time encourage the seeding of grass and coarse grains and the cultivation of land as summer-fallow.

The scheme was first announced by Order in Council¹ in April, 1941. The Minister of Agriculture was empowered to make four types of wheat acreage reduction payments in Manitoba, Saskatchewan, Alberta and the Peace River and Creston Districts of British Columbia:

- (1) \$4.00 in respect of each acre summer-fallowed in 1941 in excess of the number of acres summer-fallowed in 1940;
- (2) \$2.00 in respect of each acre which is sown in coarse grains or grass or both in 1941 before July 1, in excess of the number of acres which was in coarse grain or grass or both before July 11, 1940;
- (3) \$2.00 in respect of each acre which is sown in rye or grass or both after July 31, 1941, in excess of the number of acres of cultivated land under rye or grass before July 1, 1940;
- (4) an additional \$2.00 per acre in respect of any payment due under (1), (2) and (3) on land sown to grass or rye or both in 1941 and is in grass or rye or both on July 1, 1942, provided that such acreage in grass in 1942 is additional to the acreage in grass on July 1, 1940.

No payments for reduction in wheat acreage were authorized in respect of the following lands:

- (a) farm lands operated as Experimental Farms;

- (b) farm lands declared sub-marginal under the provisions of a provincial statute and not occupied in 1940;

- (c) farm lands, operated by Provincial Governments, government institutions, or universities.

In general, payments were based on the number of acres by which the farmer reduced his wheat acreage in 1941 as compared with 1940. Special provision, however, was made for the treatment of individual cases where considerable land had been broken or an unduly large area left fallow during the 1940-41 crop year.

It was decided to continue the Wheat Acreage Reduction Program for the 1942-43 crop year, it being estimated that the continued lack of available storage space would only permit total deliveries of 280,000,000 bushels. Accordingly in March, 1942, "The Wheat Acreage Reduction Act, 1942," was passed, replacing the Order in Council basis for the scheme with a definite statutory basis. A few changes over the previous year's policy were embodied in the Act: the bonus for diverting acreage from wheat to summer-fallow was reduced from \$4 to \$2 per acre; and whereas under the 1941 Regulations the wheat acreage of 1939 and 1940 were both taken into account in arriving at the basic wheat acreage in an individual case, the Act provided that in calculating the wheat acreage reduction for 1942 the 1940 wheat acreage only would be taken into consideration (except where there had been no wheat grown in 1940, in which case the 1939 wheat acreage would be taken as the basic acreage). The administration of the scheme continued to be entrusted to the Director of Prairie Farm Assistance.

The acreage devoted to wheat was curtailed in 1942-43 even more than in the preceding crop year.

The Wheat Acreage Reduction Program was renewed for the 1943-44 crop year, the Dominion Government having decided again to limit wheat deliveries to 280,000,000 bushels. The modifications necessary to make the program effective for 1943-44 were embodied in an amendment to the Wheat Acreage Reduction Act, assented to April 21, 1943. Instead of requiring wheat lands to be diverted to specific uses as heretofore, a flat rate of \$2.00 per acre was made payable in respect to the wheat acreage reduction on any farm, provided that the land taken out of wheat was not abandoned, ("abandoned" was defined as land "not in crop or in summer-fallow, or which if sown to grass, has lost its productivity").

The operation of the scheme in 1943-44 resulted in an even further reduction in acreage devoted to wheat.

In the three years in which the Wheat Acreage Reduction Scheme operated—1941-42, 1942-43 and 1943-44—over eighty-five million dollars (\$85,815,162.69) have been distributed to the farmers and farm-landowners of Western Canada in direct money payments.

As a consequence of the lessening of the pressure on storage space available for wheat in Canada during the 1943-44 crop year and the inauguration of export participation payments on coarse grains, the Wheat Acreage Reduction Program was discontinued after the 1943 season.

THE PRAIRIE FARM ASSISTANCE ACT

In order to aid farmers who suffer low yields because of uncontrollable factors, the Prairie Farm Assistance

¹ P.C. 2456 (April 8, 1941) and P.C. 3047 (April 30, 1941).

Act was passed on June 3, 1939; it provides for the making of direct money payments by the Dominion to farmers experiencing low crop yields in the spring wheat area of Canada. The payment may take one of two forms. (1) emergency year assistance, and (2) crop failure assistance. Under either type of assistance the individual award is only payable on one-half the farmer's cultivated acreage—up to a maximum of 200 acres on a farm with 400 cultivated acres or more; and under crop failure assistance a minimum of \$200 is payable to each farmer.

An emergency year may be declared by the Governor in Council under authority of section 3 of the Act in any year when conditions warrant such action. Awards are then payable in all townships in the "spring wheat area" (Manitoba, Saskatchewan, Alberta, and the Peace River District of British Columbia) in which the average yield of wheat is 8 bushels per acre or less. Payment is made at the rate of \$2 an acre in townships where the yield is less than 4 bushels of wheat per acre; \$1.50 per acre in townships having a yield of from 4 to 8 bushels. In addition it is provided that payments may be made in townships with a yield of from 8 to 12 bushels when the average price of wheat in the August to November period is less than 80 cents for Number One Northern, basis Fort William; these payments are on a sliding scale, the rate being \$1 per acre when the price is less than 70 cents and decreasing by 10 per cent for each cent by which the average of wheat exceeds 70 cents per bushel until at an average price of 80 cents no awards are payable.

The second form of payment—crop failure assistance—is payable, under section 4 of the Act, when the average yield of wheat, as a result of causes other than hail, is 5 bushels per acre or less in each, or not less than 171 townships in Saskatchewan, or 90 townships in Alberta, or 54 townships in Manitoba.¹ The Act authorizes the payment of \$200 to each farmer in a crop failure area, or an amount not exceeding \$2.50 per acre with respect to half his cultivated acreage (up to 200 acres), whichever is the greater.

The administration of the Prairie Farm Assistance Act was made the responsibility of the Dominion Department of Agriculture. An office was established at Regina; field men were employed to estimate yields in townships which were considered as possibly eligible for assistance, and later, to check the cultivated acreage of individual farmers in townships qualifying for payments under the Act. A committee of review was appointed by Order in Council to check on the findings of the field men.

The Act as passed in 1939 made provision in section 6 for the raising of funds to meet the assistance payments by authorizing the imposition of a levy of one per cent of the purchase price on all grain marketed in Canada. The Minister of Finance was required to credit all revenue arising from this source to a special account in the Consolidated Revenue Fund called the Prairie Farm Emergency Fund. Payments were only to be made out of this Fund upon authorization of the Minister of Agriculture, acting in accordance with the provisions of the Act, one of which (section 7) stated that 60 per cent of the award shall be paid the farmer in December and 40 per cent in the following March. The

Board of Grain Commissioners was made responsible for the actual collection of the levy through the licensed elevator operators and grain buyers.

The 1939-40 crop year was declared by the Act itself (section 3) to be an emergency year; in Saskatchewan yields later proved to be so low that the crop failure assistance provisions were declared to be applicable to many townships. Payments made in the Act's first year of operation aggregated \$9,872,401.57.

At the 1940 session of Parliament the Prairie Farm Assistance Act was amended in several respects. Statutory provision was made for a Board of Review composed of three persons appointed by the Governor in Council on the recommendation of the Minister of Agriculture (section 5). The Board assumed the responsibility, formerly discharged by the Minister of Agriculture, of determining the average yield of wheat in the various townships of the spring wheat area and of authorizing the making of payments in those cases where the conditions of eligibility were deemed to be met. This Board of Review succeeded the Committee of Review set up by Order in Council for the 1939-40 crop year, with somewhat wider authority.

The 1940-41 crop year was declared by the Board of Review to be an emergency year, the average price of wheat being found to fall short of 80 cents per bushel by 8.57 cents. No crop failure assistance payments were made, but the total of the awards amounted to \$6,771,075.82.

The Prairie Farm Assistance Act was again amended in 1941. It was provided that any rectangular area of nine sections or more within an ineligible township may be declared eligible for payments under the program if it has a yield of 10 bushels per acre or less, and lies along an eligible township, and, conversely, that similar areas in eligible townships may be declared ineligible if they have a yield of 14 bushels per acre and lie along ineligible townships. With the Prairie Provinces suffering from the most severe drought since 1937, more townships qualified for payments under the Act in the 1941-42 crop year than in the two previous years of its operation (2,804 townships as compared with 1,679 in 1940-41 and 1,923 in 1939-40). Both emergency year assistance and crop failure assistance payments were made. The former payments were made at the rate of 70 cents per acre, the average price of wheat being 73 cents per bushel. Payments under both forms of assistance totalled \$15,573,320.47.

The 1942-43 crop year was characterized by favourable weather and abundant harvests in the Prairie Provinces. Accordingly, 1942-43 was not declared to be an emergency year under section 3 of the Act, nor did any of the provinces make application for the declaration of a Crop Failure Area under Section 4 of the Act. Therefore, no awards were paid.

Emergency year and crop failure payments were again resumed in 1943-44, with payments of the two types. The total amount paid out was \$7,467,836.41.

PRAIRIE FARM INCOME PAYMENTS

In order to supplement farm income in the Prairie Provinces in 1941 an Order in Council was passed by the Dominion Government under authority of the War Measures Act providing for direct payments to farmers. Payments were made only for the crop year 1941-42. The cultivated acreage of each producer was taken as

¹ Under the original 1939 Act the requirements were 135 townships in Sask., and 100 in each of the Provinces of Alberta and Manitoba. This was changed by an amendment passed in 1940 to the figures given above.

the most equitable basis upon which a cash addition to income could be distributed. Accordingly, by section 2 of the Order, the Minister of Agriculture was empowered, on and after December 1, 1941, "to pay to any farmer in the spring wheat area the sum of 75 cents per acre on half the cultivated acreage of the farm, provided that the total amount thus to be paid to any one farmer shall not exceed \$150." A total of almost 19 million dollars was paid out.

To qualify for an income payment a farmer was required to make application to the Secretary of the Municipality in which he resided, or, in the case of Unorganized Areas, directly to the Provincial Government. No such application was necessary in the case of a farmer who had filed a cultivated acreage report for the 1941-42 crop year with the Prairie Farm Assistance Office in Regina. Numerous farm lands were excluded from the provisions of the Order in Council, namely:

- (a) farm lands operated as Experimental Farms;
- (b) farm lands operated by provincial governments, government institutions or universities;
- (c) farm lands used for ranching purposes;
- (d) farm lands operated as market gardens;
- (e) farm lands operated by Indians on Indian Reservations;
- (f) irrigated lands, except those sown to wheat, oats, barley, rye, and flax, or in summer-fallow, in 1941, and then only when the total acreage of such crops and summer-fallow is not less than two thirds of the cultivated acreage of the farm.

LAND SETTLEMENT AND LAND USE

Canadian Land Grant Policy Since Confederation

The newly constituted Dominion of Canada embarked upon an ambitious experiment in agricultural colonization in 1870 when that vast area of the North West, known as Rupert's Land (which was five times the size of the Dominion proper), was transferred to its jurisdiction from the Hudson's Bay Company. In the 60 year period following—from 1870 until 1930, at which time ownership of the Crown lands in the Prairie Provinces was transferred to those Provinces—the Federal Government made extensive free grants of land in four main ways:

- (1) Grants to the Hudson's Bay Company;
- (2) grants to the railway companies, especially the C.P.R.;
- (3) direct homestead grants to settlers, including the original inhabitants—the Metis;
- (4) grants to public schools.

Direct Grants.—The first grant of land the Dominion gave after coming into possession of the great domain of the North West, was to the inhabitants of Assiniboia as at the time of the transfer.

As to the granting of free lands to settlers in general, the policy of the Federal Government was first expressed in an Order in Council passed on March 1, 1871. This measure provided for homestead entries upon quarter sections, with a fee of \$10 and residence requirements of 5 years before the granting of patent. The Dominion Lands Act, passed the following year, embodied the terms of the Order in Council except that the residence requirement was reduced from 5 to 3

years. By an amendment adopted in 1874 (S.C., 1874, chap. 20), the homesteader was given a 3 year option to purchase adjoining Dominion Lands "at the Government price" to the extent of 160 acres. This right of "pre-emption", as it was termed, gave assurance to the settler that while he was perfecting title to his homestead he would not be prevented from subsequently enlarging his farm through the occupation of adjoining land by other homesteaders. The pre-emption policy had much in it that was commendable, but at the same time gave rise to many abuses. It served to scatter settlement, to retard it by keeping large amounts of land uncultivated; it encouraged many settlers to mortgage their homesteads so as not to lose out on the option and then to lose both the homestead and the pre-emption; above all, it gave rise to opportunity for speculators. Consequently, the pre-emption provisions of the Dominion Lands Act were repealed in 1890. Pre-emption was later revived in 1908, when the Dominion Lands Act of that year provided that any homesteader who had not previously received a pre-emption was entitled to claim an adjoining quarter section upon payment of \$3 an acre and fulfilling the 3 year cultivation requirements. The chief purpose behind the revival of pre-emption was to raise funds for the construction of the Hudson Bay Railway through the sale of odd-numbered sections which an Order in Council of 1889 has specifically reserved throughout Dominion lands to assist in the construction of "colonization railways".

The pre-emption and purchased homestead sections (27 and 28) of the Dominion Lands Act, however, only remained in force until 1918, at which time they were repealed to make way for the Soldier Settlement Act.

The free-homestead system of encouraging rapid settlement, as will be noted presently, reached its maximum development only after the termination of railway land grants, but from the outset it was closely associated with them. Thus, the even-numbered sections, originally reserved for sale by the government, were in 1882 thrown open everywhere for free homesteads so as to stimulate settlement and enhance the value of the odd-numbered sections reserved by Act of Parliament at that time for the C.P.R.

The policy of encouraging settlement through the granting of free homesteads, however, really came into its own after 1896.

With the transfer in 1930, Manitoba and Saskatchewan practically abrogated the free-homestead system in favour of a system of land sales. Alberta retained a modified free-homestead system with residence requirements of 5 years, rather than 3 years as under the old Federal policy. Furthermore, entry was restricted to the settler who had already resided not less than 3 years in the province and was "a British subject or who declares his or her intention to become such". A "northern" area was set aside by Order in Council for general homesteading, but for the southern area, homestead, second homestead, or soldier grant entry is limited to persons with experience in the country who are living on land owned and occupied by themselves (or certain near relatives) within 9 miles of the land for which entry is proposed.

New Brunswick.—By the Free Grant Act of 1872 the New Brunswick legislature authorized free grants of 100 acres (200 acres to married men with two or more children) in selected areas, with homestead and residence requirements for three years, and with cash bonuses for

the clearing of lands. In 1879 cash bonuses for clearing were replaced again by expenditures on public roads. Of 610,108 acres granted from 1878 to 1898 all but about 63,000 acres were gratis—the remainder being sold by auction or otherwise.

The free homestead policy of New Brunswick had little in common with the free homestead policy followed in Western Canada during the period of active settlement. The former was really a lumber policy, providing large revenues from stumpage and other dues; the latter was definitely a settlement policy geared to the general development of the young Dominion.

Nova Scotia.—At Confederation, little ungranted land suitable for agricultural purposes remained in Nova Scotia. During the early 70's a policy of free homesteads was adopted on a small scale, free grants of tracts up to 100 acres being made with residence requirements of five years. In 1872 there were only 30 applications for free homesteads, fewer still in 1873. The Homestead Act was finally repealed in 1877.

Ontario and Quebec.—Opportunity for adoption of a policy of free homestead grants in the post-Confederation era in Ontario and Quebec was very limited because of the large measure of land settlement already achieved in these provinces. In Western Ontario, however, the free homestead was still feasible upon the fringes of settlement and the passing of the Free Grant and Homestead Act in 1868 marked an already too late attempt to make the free homestead a staple of land policy.

School Lands.—The Dominion Lands Act of 1872 provided for the setting aside of sections 11 and 29 in each township as an endowment for public schools. By the Consolidated Dominion Lands Act of 1879 administration of these school lands was placed with the Minister of the Interior. The Minister sold certain of these lands from time to time by public auction, investing the proceeds in Dominion securities. The funds were then distributed annually to the provincial governments to be expended upon the maintenance of public schools therein.

Since 1930 the provincial governments of the Prairie Provinces have followed the same policy of administering school lands as followed by the Dominion, the keystone of which is sale by public auction at times of favourable prices.

Settlement Under Dominion Auspices

From the time of Confederation until March, 1892, all matters directly relating to immigration and settlement were under the jurisdiction of the Department of Agriculture. Between March, 1892 and October, 1917 these matters were administered by a separate branch of the Department of Interior. In 1917 an autonomous Department of Immigration and Colonization was established; this Department continued in existence until December 1, 1936, when it was reconstituted as the Immigration Branch of the Department of Mines and Resources.

Through the various administrative divisions mentioned above, the Dominion Government has co-operated with the Colonization Departments of the Canadian Pacific and Canadian National Railways in the settlement of immigrants and resident Canadians in general.

The Federal Soldier Settlement Board has been primarily concerned with the re-establishment and estab-

lishment on the land of veterans of the Great War. The statutory authority for the creation of the Board—"The Soldier Settlement Act"—was passed by the Dominion Parliament in 1917. The Board actually came into being on January 30, 1918. The Board was charged with the supervision of the granting of loans (up to a maximum of \$2,500 in any individual case) and with the procurement of suitable land for settlement purposes, the Board was first placed under the jurisdiction of the Department of Interior. On August 17, 1923, however, the Soldier Settlement Board was transferred to the Department of Immigration and Colonization because this Department hitherto lacked the necessary field officers for the expanded general land settlement scheme it contemplated embarking upon. The Chairman of the Soldier Settlement Board became the Superintendent of the Department's Land Settlement Branch and the Board's field officers assumed the responsibilities of general settlement agents.

During 1930, the set-up of the Soldier Settlement Board was subjected to an extensive investigation and was reorganized.

In 1942 the administration of the Veteran's Land Act was assigned to the Soldier Settlement Board.

The initial function of the Soldier Settlement Board was to grant ex-servicemen loans to assist in their settlement of free Dominion lands in the Western Provinces, on lands already owned by them, or on lands which were available for purchase from private interests. At the request of the Board, the Minister of Interior was authorized by Parliament to give to every settler fulfilling certain conditions, a free entry for not more than 160 acres of public land. Cash loans extended by the Board were used for a variety of purposes including the purchase of farm land, the clearing of encumbrances, erection of farm buildings and the purchase of livestock, harness, machinery and agricultural equipment in general.

Since the bulk of credit extended was granted during the early 1920's at a time of abnormally high prices, debt adjustment became necessary. Legislation providing relief was passed in the form of amendments to the Soldier Settlement Act in 1922, 1925 and 1927. This last mentioned amendment authorized the Board to determine the depreciation of the lands purchased by the ex-servicemen and to credit their accounts with the amount of such depreciation.

The serious conditions prevalent in the early 30's finally led to the passing of the "Bonus Legislation" Amendment Act in May, 1933. This Act provided for a dollar for dollar bonus on instalments due and payable between March 31, 1933 and March 31, 1936, and instalments due one year thereafter, providing such payments take place prior to March 31, 1936.

The Three Thousand British Family Scheme.—An agreement was negotiated in 1924 between the British and the Canadian Governments, providing for the settlement within the following three years of 3,000 British families on farm lands owned by the Canadian Government. Britain provided \$1,500 per family for the purchase of chattels and Canada, through the agency of the Soldier Settlement Board, agreed to prepare the land for occupation, purchase chattels for the families, supervise the family's operations, collect advances due, and advise and assist in general the new settlers. Provision was made that should the land be abandoned by

any family it would be resettled with another British family, whether selected before or after the expiration of the three year period mentioned in the main terms of the agreement.

The New Brunswick 500 Family Settlement Scheme.—Another general settlement project in which the Soldier Settlement of Canada played a vital role was that which arose out of an agreement entered into in 1927 by the governments of the United Kingdom, Canada and New Brunswick, providing for the settlement of 500 British families in the province of New Brunswick over a period of six years beginning in 1928. Under the terms of the agreement, the New Brunswick Government supplied the land, the British Government advanced up to \$1,500 per family for the purchase of equipment and the Dominion Government, through its Soldier Settlement Board, assumed responsibility for administration and supervision.

In 1935 the original agreement was modified after the government of New Brunswick made representations to the Dominion to the effect that in view of prevailing depression conditions it appeared likely that a large number of the British settlers still on the land were likely to abandon their farms and become a relief burden to municipal authorities. The Federal Government took over the title of the lands still occupied and made a payment to the province of New Brunswick of an amount equivalent to the principal sums then due under the land contracts (\$521,157) with interest at 5 per cent.

The Continental Family Scheme.—Under an agreement with the Canadian Pacific and Canadian National Railways (which appears to have been negotiated in 1926), the Dominion Government undertook to find farms for 1,000 families from continental Europe, provided each family deposited \$400 upon land, which money would be used to provide farm machinery and equipment. The aftercare obligations assumed by the Government were similar to those in the case of the 3,000 British families except that no financial assistance was promised.

The Hoadley Scheme.—In 1926, the then Minister of Agriculture for Alberta succeeded in negotiating an agreement between the United Kingdom, the Dominion of Canada and the Province of Alberta, whereby certain young men were brought out from the British Isles, given a course of training at Alberta agricultural schools and then handed over to the Land Settlement Branch (i.e., the Soldier Settlement Board) for placement on farms and for supervision. Very few young men took advantage of this scheme.

British Farm Workers Settlement Scheme.—In 1925 the Canadian Minister of Immigration and Colonization negotiated with the British Government an agreement providing for cheap passage to Canada of British farm workers. The Dominion guaranteed that suitable work would be found for them on arrival and that for five years following they would receive supervision from the Land Settlement Branch.

Land Settlement—Provincial

British Columbia.—The Land Settlement Board of British Columbia was constituted in 1917 in accordance with the provisions of the "Land Settlement and Development Act" as a branch of the provincial Depart-

ment of Agriculture. The purpose behind the establishment of this Board was the promotion of greater agricultural production. In addition to providing farm credit, the Board could purchase, develop and colonize lands deemed suitable for settlement; and declare settlement areas within which development of lands could be stimulated by regulating the price of unimproved lands, and by imposing penalty taxes in the event of non-development.

Under the provisions of the "Drainage, Diking and Development Act", the British Columbia Settlement Board was given authority to act as Commissioners for any district established for the purpose of draining, reclaiming, or protecting lands against damage by flood.

The British Columbia Land Settlement Board is still in existence, but the extent of its activity is very limited.

Ontario.—In Ontario, a separate department of government—the Department of Northern Development—was established in 1926 to facilitate settlement within the province. More specifically, the Department was created to administer four pieces of legislation:

- (1) The Northern Development Act, (S.O., 1926, Chap. 10)
- (2) The Returned Soldiers' and Sailors' Land Settlement Act, (S.O., 1917, Chap. 13)
- (3) The Returned Soldiers' and Sailors' Land Settlement Act, 1919 (S.O., 1919, Chap. 15)
- (4) The Colonization Roads Act (S.O., 1913, Chap. 11).

This meant the Department had a considerable field of activity, including the following: construction and improvement of roads and means of transportation and communication in general; the purchase and distribution to farmers and settlers of seed grains, seed potatoes, garden seeds in general, agricultural implements, cattle and livestock and other settlement requirements; the purchase of lands, easements, rights-of-way, buildings and structures deemed advisable for the assistance of settlement; the erection and equipment of schools and other public buildings; and operations in general facilitating settlement.

The activities of the Department continued until 1937 at which time they were suspended. Judging from the Annual Reports issued in the later years of its existence road and bridge construction occupied the bulk of the Department's attention and considerable emphasis was laid on mining.

Quebec.—In Quebec, government activity in respect to land settlement has emanated from the Department of Colonization, Mines and Fisheries whose existence dates from 1905. This Department concerns itself with facilitating settlement through the construction of roads, the preparation of official plans and books of reference, the conducting of sales of public lands suitable for farming purposes, and so on.

In 1920 the Department was given authority to grant loans bearing interest not in excess of 6 per cent to assist settlers. In more recent years, the Department has given particular attention to the settlement of farmer's sons resident in the province and to the repatriation on Quebec farm lands of French Canadians who have migrated to the Northern United States. The govern-

ment of Quebec has been more active than that of any other province in the matter of land settlement in recent years. Many thousands of settlers have been established on land under one or other of several assistance schemes.

New Brunswick.—In 1912, the passing of "An Act to Encourage Settlement of Farm Lands" (New Brunswick Acts, 1912, chap. 28) by the provincial legislature led to the establishment of The Farm Settlement Board of New Brunswick. It is empowered to purchase and hold real estate, to improve it by erecting houses and buildings, to take over any public forest lands suitable for farming and to sell farms and farm lands to settlers at a price not exceeding their cost to itself.

Originally a separate corporate body, the Board was placed under the control and direction of the Minister of Agriculture in 1914. Thereafter a brief account of the Board's activities appears in the Annual Report of the Department. An examination of these reports reveals that the Board has been occupied primarily with the settlement of native New Brunswickers on the land rather than with immigrants.

The Farm Settlement Board of New Brunswick co-operated with the Soldier Settlement Board in accordance with the will of the provincial legislature as expressed in New Brunswick Acts, wherein it was provided that the Farm Settlement Board should transfer land to the Soldier Settlement Board upon the latter approving the settlement of a particular returned man on land in the provincial board's possession.

The obligations of the New Brunswick Government assumed under the 500 British Family Scheme described earlier were discharged by the Immigration Branch of the Department of Agriculture rather than by the Farm Settlement Board.

While the Farm Settlement Board has granted no new loans since the beginning of 1940 in the light of wartime conditions, it continues to service outstanding contracts and to redeem certain of its real estate holdings for cash.

Nova Scotia.—The government of Nova Scotia first undertook to give assistance in land settlement in 1912 when it passed "An Act for the Encouragement of Settlement on Farm Lands". The Act was particularly designed to help ex-Nova Scotians and new immigrants from the British Isles become full fledged land owners. The government did not grant loans directly to settlers; rather it undertook to make certain guarantees to established loan companies willing to extend credit on the security of first mortgages, and it further agreed to make limited advances in certain cases through the regular facilities of the companies.

The Nova Scotia Farm Board continued in existence until 1937 when by Chap. 51 of the Nova Scotia Laws, 1937, "the estate, right, title and interest" in all property hitherto enjoyed by the Board and all the powers possessed by it were transferred to the Nova Scotia Land Settlement Board.

The Nova Scotia Land Settlement Board was established by "The Nova Scotia Land Settlement Act" (Nova Scotia Laws, 1932, Chap. 8; originally entitled "The Nova Scotia Miners' Land Settlement Act"). The primary function of the Board originally was to establish Nova Scotians from the coal mining districts, on farms and lands within the province. In 1933, how-

ever, the settlement activities of the Board were extended so as to embrace any British subject of five years or more residence in Nova Scotia who had formerly been employed in manufacturing or transportation.

As at November 30, 1942, a total of 720 settlers had been placed by the Board. The judgment given in the annual return of the Board as found in the Report of the Nova Scotia Department of Agriculture for the year ended November 30, 1939, was that the work of the Board had proved to be a costly form of relief.

Relief Settlement

With the increase of unemployment both on the farm and in the city in 1930, 1931 and 1932, action was taken by the Dominion and Provincial Governments to alleviate the situation. Relief settlement was not necessarily a function of the Departments of Agriculture—but they co-operated in the administration of the various settlement schemes.

A Relief Settlement Scheme was inaugurated under the provisions of the Relief Act, 1932, when the Dominion Government entered into agreements with all provinces except Prince Edward Island. These agreements were renewed under the Relief Acts, 1934 and 1935, to March 31, 1936. Further agreements with Quebec, Manitoba and Alberta were entered into under the terms of the Unemployment Relief and Assistance Act, 1936, and the Unemployment and Agricultural Assistance Act, 1940.

Agreements made under the Relief Act, 1932, provided for a non-recoverable expenditure by the Dominion of one-third of an amount not to exceed \$600 per family for the purpose of providing a measure of self-sustaining relief to families on the land. The remaining two-thirds was to be constituted by the province and municipality concerned. These agreements covered a period of two years and expired on March 31, 1934.

Expenditures under the agreements were made chiefly for the breaking and clearing of land, the purchase of building materials, farm implements and livestock, and for the transportation of settlers and their belongings.

Legislation was provided for the continuation of the agreements made under the Relief Act, 1932, beyond March 31, 1934, until March 31, 1936. These agreements further made provision for an additional non-recoverable contribution by the Dominion, on the recommendation of the province and with the approval of the Governor in Council, of one-third an amount, not exceeding \$100 in the case of a settler who might not be self-supporting at the end of the two-year period and for whom subsistence expenditures during the third year of settlement was deemed necessary. This additional amount for subsistence during the third year, where necessary, applied to those settled under the 1932 agreements as well as to those settled under the renewal agreements.

Under the Unemployment Relief and Assistance Act of 1936 further agreements effective from April 1, 1936, to March 31, 1940, provided continuity of settlement with the agreements which expired March 31, 1936, and were entered into with Quebec, Manitoba, and Alberta. These agreements made provision for the placement of further families on the land and to this end, authorized a non-recoverable expenditure by the Dominion of one-third of an amount not to exceed \$1,000 per family for a period of four years. In regard to families settled

under previous agreements, provision was made for an additional non-recoverable contribution by the Dominion of one-third of an amount not exceeding \$80 for each of these families for the fourth year of settlement, and an amount not exceeding \$70 per family for the fifth year of settlement. In the agreement with Manitoba, provision was also made for a Dominion grant of one-third of a sum not exceeding \$70 for the sixth year of settlement on behalf of families settled under the original 1932 agreement.

Under the terms of the renewed Act, in 1940 further agreements providing for the continuity of settlement schemes under the agreements which expired March 31, 1940, were entered into with the provinces of Quebec, Manitoba and Alberta. These new agreements provided for contributions by the Dominion to expenditures incurred for a period of four years in respect to settlers placed to March 31, 1942, and to expenditures for further assistance, where deemed necessary, to those settled under earlier agreements, with the understanding that Dominion contribution toward expenditures incurred after March 31, 1941 were contingent upon Parliament appropriating the funds necessary to meet such contributions.

The agreements with Manitoba and Alberta provided for Dominion assistance to the extent of one-third of the total expenditures incurred not in excess of \$1,000 per family settled; in the Quebec agreement the total expenditure per family toward which the Dominion would contribute was \$800, \$1,000, or \$1,200, depending upon the number in the family and the locality in which settlement was made, it being stipulated, however, that the aggregate maximum amount to be granted by the Dominion should not exceed such a total as would result if a contribution of \$333.33 was made on behalf of each family. The agreements with Manitoba and Alberta provided that the total expenditures on behalf of any one family during the first two years of settlement should not exceed \$820, and that \$100 should be reserved for the third year and \$80 for the fourth year of settlement. Similar provisions were incorporated in the agreement with Quebec, the maximum amounts to be spent in the first two years and the amounts to be reserved for the third and fourth years being proportionate to those set forth in the Manitoba and Alberta agreements.

These agreements with the provinces of Quebec, Manitoba and Alberta expired on March 31, 1942, but since the plan provided for assistance over a four year-period from date of settlement, the Dominion is still meeting provincial claims rising out of the scheme.

Land Reclamation

Irrigation.—The Dominion and Provincial Governments have carried out experimental work extensively for dry farming and livestock operations, and less extensively for irrigation farming.

The first Irrigation Act dates from July 23, 1894, in which year the Canadian Irrigation Surveys were commenced by the Department of the Interior.

When fruit-growing was first established in British Columbia, irrigation companies operating for their own profit agreed to provide the necessary water for irrigation, but most of these companies have since failed, and have been taken over by growers' organizations and incorporated into Irrigation Districts or small Water Users' communities. These 20 districts, for the most

part, have been financed by Provincial Government loans, although two municipalities in the Okanagan Valley operate their own irrigation systems for the residents. In addition, there are three irrigation companies still operating, as well as a large soldier settlement project controlled by the Provincial Government. Altogether there were more than 37,000 acres under irrigation in British Columbia in 1940.

In Saskatchewan and Alberta, new irrigation projects were established under the Prairie Farm Rehabilitation Water Development Program. Engineering service is furnished free to the extent that staff is available and financial assistance is provided.

Drainage.—In the Eastern Provinces, assistance is provided by the Provincial Governments for the purpose of drainage.

In Prince Edward Island, as early as 1916 drainage assistance was provided for farmers. The Act was modelled on the Ontario Drainage and Watercourse and Ditches Act. The assistance was in the form of financial loans to farmers.

The Province of Nova Scotia assists farmers in the purchase of tile for the drainage of farms, in transportation costs of tile, and provides engineering supervision.

In order to encourage farm drainage, the Province of New Brunswick has, over a considerable number of years, assisted farmers in freight payments on drain tiles.

In Quebec, the Provincial Government will pay the freight charges on shipment of tile in carlots to the nearest station, when it is to be used by one or more farmers. On small ditches on individual farms the Government will pay about 50 per cent of the cost of drainage. In cases where large ditches, such as municipal drains or main ditches, the Province will supply complete engineering services, including the ditch machines, and will pay the operating costs. Such work is, however, undertaken only on requisition of the parish.

In Ontario, the Tile Drainage Act provides for proper drainage services. Loans to individuals under this Act may not exceed \$2,000 for each 100 acres of land or fraction thereof, and for not more than 75 per cent of the cost of the work.

Diking.—For many years the marshlands forming the shore of the Bay of Fundy in Nova Scotia and New Brunswick had been protected by dikes. Over the years many of them had fallen into disrepair and much valuable hay land had been inundated or was threatened with inundation.

In 1942 a grant was made available by the Dominion to conduct surveys and preliminary investigations of the extent of works necessary to repair dikes and rehabilitate the marshlands. The Maritime Dikelands Rehabilitation Committee, comprising four representatives from New Brunswick, four from Nova Scotia, and a soil scientist and Dominion representative, was formed to study the problems of the marshlands and supervise such projects as might be undertaken. The Superintendent of the Dominion Experimental Farm at Nappan is chairman of this Committee.

In May, 1944, the Dominion Government agreed to contribute a specified sum to cover the costs of the repair work which would be conducted on the dikes. The two provinces agreed to match jointly this sum. One-third of the total cost of any project would be contributed by the men who own the marshland.

The Prairie Farm Rehabilitation Act

Crop failure has been a hazard to contend with on the prairies of Western Canada. The drought that began in 1929 and continued for as many as nine crop years in some localities was perhaps the most severe experienced. During this period many millions of dollars were advanced by the Dominion and Provincial Governments to provide seed and feed, and to relieve distress. Out of this disaster was born a program of rehabilitation and improved agriculture, under the authority of the Prairie Farm Assistance Act, 1935, and with provincial assistance in various forms.

The Prairie Farm Rehabilitation Act (25-26 George V, c. 23) was passed by the Parliament of Canada in April, 1935, "to provide for the rehabilitation of drought and soil-drifting areas in the provinces of Manitoba, Saskatchewan and Alberta". Emphasis was placed upon assistance to farmers in the development of water supply and improved farm practices. Under the terms of this Act the Minister of Agriculture was authorized to introduce throughout the affected area those "systems of farm practice, tree culture, and water supply that will afford greater economic security" to the agricultural population. By an amendment to the Act in March, 1937 (1 George VI, c. 14) "land utilization and land settlement" were included as additional objectives, while a later amendment in March, 1939 (3 George VI, c. 7), removed the original five-year limit to the life of the Act. In 1941 the Minister of Agriculture was authorized to purchase land.

In accordance with the terms and intentions of this Act there has been organized, throughout the drier regions of the Prairie Provinces, comprising over 400,000 square miles, located in Southwestern Manitoba, Southern Saskatchewan and Southeastern Alberta, a rehabilitation program which has as its main objective the adjustment of prairie agriculture to new conditions imposed by the severe droughts of the 1930-1937 period and by depressed conditions affecting western grain production since 1929. This rehabilitation program covers three main phases of work: (1) Water Development; (2) Land Utilization; directed from the Prairie Farm Rehabilitation Office in Regina, Sask.; and (3) Cultural, under the Dominion Experimental Farms Service.

Water Development.—The conservation of the limited surface water resources in the Prairies—this work includes such activities as dugouts, stock-watering dams and small irrigation systems on individual farms, community projects involving the co-operation between farmers in a community, large development projects including irrigation and water storage. Water development carried out under the P.F.R.A., under the supervision of the Superintendent of Water Development, consists of large and small projects. The large projects include storage and irrigation works on the larger rivers and streams and are intended to serve community needs and provide for rehabilitation on a community scale. Small projects consist of dugouts, stock-watering dams and irrigation works. These are developed for the purpose of providing water on individual farms from the smaller streams and local run-off. Individual projects are supplemented in some areas by small community projects which are usually operated by the municipality. The larger projects are usually constructed by contract and the total cost paid from the P.F.R.A. vote. In the

case of small water development projects, financial assistance is provided under P.F.R.A., on a self-help basis to cover only part of the construction costs, and applicants are responsible for the construction of the works. Financial assistance is payable to applicants in the case of small projects only when the works are completed to conform to provincial water rights regulations and to plans and specifications approved by the supervising engineer.

Land Utilization.—The objectives of the program are the removal of poor land from cultivation and the return of such land to grazing, and the resettlement on suitable farm land of farmers removed from submarginal areas. Reason for this may be low fertility, poor texture or aridity which has proved submarginal for crop production. Farmers in operation on such land have been moved to better areas, and the land so vacated or previously abandoned has been fenced in for use as P.F.R.A. Community Pastures. In this manner the unprofitable use for crop production of a large acreage of submarginal land has been stopped and provision made for its profitable use through grazing.

In general, agricultural settlement in Canada comes under provincial jurisdiction. For this reason, P.F.R.A. settlement work has been largely limited to the relocation of farmers removed from community pastures, and to settlement on large P.F.R.A. irrigation projects. One exception occurred in 1936 when the P.F.R.A. organization co-operated with provincial authorities in transferring 63 farmers from dried-out areas in Saskatchewan to better locations elsewhere, by paying freight charges on effects and livestock. Relocation of Farmers Moved from Community Pastures.—In the development of community pastures, over 200 farmers have been moved to new locations, in some cases with provincial assistance, to suitable holdings near the pastures, in other cases to new P.F.R.A. irrigation projects.

On the Community Pastures, male breeding animals of suitable breeds of cattle are maintained in sufficient numbers on each pasture by the government.

Purebred bulls are provided by the P.F.R.A. for the various pastures on the following basis. For the first 3 years of pasture operation, the necessary bulls are supplied free. For the second period of 3 years a charge of one-half rental basis is made against the pasture revenues for each bull. Thereafter, full rental charges are made.

For the purpose of securing community action on problems arising from drought and soil drifting, Agricultural Improvement Associations have been organized by farmers, with assistance from the P.F.R.A. In addition, certain forms of assistance have been provided for these associations and their members. During the first five years of the program annual grants, based on the number of members, and ranging from \$50 to \$100 were made to each association. This form of assistance was discontinued after 1939. Assistance to members included personal advice on rehabilitation problems and supplies of grass seed, trees and other planting materials not otherwise readily obtainable.

Another phase of activity was that of land classification. The object is, 1) To serve as a guide to (a) those responsible for administering rehabilitation policies for the development of community pastures and for the adjustment of population to the productive capacity of the land, (b) those charged with instituting and maintaining community services and the levying of assess-

ments for such purposes, (c) loan appraisers and others interested in establishing land valuations and debt carrying capacities of the land, 2) To aid the farmers or the prospective farmers in determining the opportunity for income in one district or on a particular farm as compared with another district or another farm. The Economics Division of the Dominion Department of Agriculture in co-operation with the Department of Farm Management of the University of Saskatchewan and the Department of Economics of the University of Alberta are in charge of this work. As a part of the program, studies have been made of ranch and farm organization and management, and representative areas in the northern parts of the provinces of Alberta and Saskatchewan have been studied in order to determine the progress made by new settlers in these areas and the problems involved in the extension of a settlement. These studies are pertinent to the problem of adjustment because large numbers of people have moved from dry areas to the northern sections of the provinces of Saskatchewan and Alberta.

In addition, research in the comparative levels of living attained by farmers in the drought area as compared with those attained outside the drought area have been made. In this way, recognition of the social problems involved in the improvement of rural conditions in the Prairie Provinces was given effect.

As a part of the whole problem of utilization of land, consideration was necessary regarding the possibilities of irrigation farming and a study was made in irrigation districts in the province of Alberta.

In carrying on this work, the Economics Division of the Dominion Department of Agriculture has worked in close cooperation with the Universities in the two provinces, with the Prairie Farm Rehabilitation Administration, the Experimental Farm Service, the Provincial Departments of Agriculture, the Saskatchewan Land Utilization Board, and the Alberta Special Areas Board, and the Department of Lands in the province of Alberta.

Miscellaneous Activities.—In addition to the foregoing work a variety of rehabilitation projects come under the cultural phase. These include the establishment of pure seed grain production centres throughout the drought area, large scale grass seeding operations and grass and coverage surveys in ranching areas. An important activity is the large scale soil moisture conservation work started in 1937, involving the construction of terraces and dykes on sloping land, and emergency soil drifting control work.

The Prairie Farm Rehabilitation Act is administered through the Dominion Department of Agriculture. The provincial agencies co-operating are the 3 departments of agriculture of three provinces; the 3 soils departments of the 3 universities; and the Department of Mines and Natural Resources, Manitoba, Department of Natural Resources, Saskatchewan, and the Department of Lands and Mines, Alberta.

Cultural.—This is concerned with experimental work designed to provide information on the best cultural practices. Here the attempt is to secure the adoption by farmers of such tillage and cropping practices as will enable them to farm successfully under a wide and fluctuating range of physical and economic hazards. This work is under the direction of the Experimental Farm Service. Associated with the experimental work are the

soil surveys conducted jointly by the Experimental Farm Service and the Soils Department of the three provincial universities.

The main purpose of the cultural phase of the rehabilitation work is to enable farmers to reduce to a minimum the hazards attaching to crop production under semi-arid conditions, by the most economical utilization of soil moisture and the control of soil drifting. The various agencies through which this objective is being attained are described below, with some reference to the measures being employed and the progress made.

Dominion Experimental Farms.—Details of cultural work are supervised mainly from the Dominion Experimental Farms located at Brandon, Man.; Indian Head, Sask.; Swift Current, Sask.; Scott, Sask.; and Lethbridge, Alta. As the superintendents of these farms are thoroughly acquainted with agricultural conditions in their respective territories, they are ideally equipped to supervise this work.

District Experiment Sub-Stations.—Essentially outposts of the Dominion Experimental Farms, these Sub-Stations are privately-owned farms operated under government direction to determine and demonstrate the adaptability of various methods of crop production and soil drifting control to local conditions. By the end of March, 1944, some 45 of these Sub-Stations had been established, forming an important development of the work of the Division of Illustration Stations.

Reclamation Projects.—In certain areas where drought and soil drifting have caused the abandonment of farm land, reclamation work of an experimental nature is in progress. The object of this work is to determine the best methods of returning these areas to crop production or of removing their objectionable features as focal points of drifting by establishing a soil binding grass cover. Reclamation stations have been established at Melita, Man.; and at Mortlach, Cadillac, Woodrow, Kisbey, Craik and Estevan in Saskatchewan. Regrassing projects varying in size from a few to several hundred acres, are located at many points throughout Saskatchewan and Alberta.

Tree Planting.—The establishment of farm home and field shelterbelts of trees to afford shelter against the erosive and drying effects of high winds, is an important phase of the rehabilitation program. The most interesting feature of this work is found in the extensive experimental field shelterbelt plantations, each extending over an area equivalent to one township, which are being developed at Lyleton, Man.; Conquest, Sask.; Aneroid, Sask.; and Ribstone, Alta. The object of these plantations is to determine the value of large blocks of shelterbelts for soil moisture conservation and soil drifting control.

The Veterans' Land Act

The Veterans' Land Act 1942 is one of the rehabilitation measures designed to financially assist experienced men interested in full-time farming, or small holding settlement coupled with other employment. The provisions of the Act apply in all provinces of Canada. The maximum assistance available for the purchase of land and buildings and other permanent improvement is \$4,800, plus a maximum of \$1,200 for farm equipment and livestock—a total of \$6,000. The

interest rate is 3.5 per cent. The down payment by the veteran is 10 per cent of the cost of land and permanent improvements only, and provided the veteran complies with the terms of his settlement contract for a period of 10 years the Dominion of Canada absorbs approximately 24 per cent of the cost of the land and permanent improvements and makes a gift of the chattels to him.

Under the Veterans' Land Act four main types of establishment are available:

- (1) Farming on purchased lands as a full-time occupation for veterans with satisfactory background of practical experience.
- (2) Small holding settlement which means a suburban, semi-urban or rural home on limited acreage located close to employment.
- (3) Small holding settlement coupled with commercial fishing in coastal and inland areas where commercial fishing is a recognized industry.
- (4) A first mortgage loan up to a maximum of \$4,400 to enable a veteran to resume farming operations on land already owned by him. The rate of interest is 3½ per cent and the terms of repayment are flexible. Such loans are limited to 60 per cent of the appraised value of the land, and advances for the purchase of livestock and farm equipment are limited to \$2,500 or to 50 per cent of the approved value of the land, within the maximum mentioned above. The subsidy feature of the Act does not apply in loans of this class.

Before a veteran may acquire a farm he must be experienced in farming or acquire additional farm experience and training. The Director, accordingly, may place veterans with selected farmers for practical instruction; supply instructors and inspectors to assist veterans with information and instructions on farming; and make arrangements with Dominion and provincial departments of Government, the extension departments of Canadian universities and recognized agricultural schools and colleges for the purpose of providing training and instruction.

Under the Act the Department of Veterans Affairs may, with the approval of the Governor in Council, enter into an agreement with the Government of any province for the settlement of veterans on any provincial lands which may be considered suitable by the provincial Governments. This arrangement may be made where the province wishes to promote its own veterans' land settlement program. The veteran would have an agreement with the province in respect to the land and procurement of title. Under the agreement, the Director of the Veterans' Land Act may grant an amount not exceeding \$2,320 to a veteran who settles on provincial lands. The grant may be used for land improvements and the purchase of livestock, equipment and machinery, for building materials and construction costs and purchase of essential household equipment. Supervision may be provided by the province.

The Alberta Special Areas Board

The Alberta Government passed the "Special Municipal Areas Act" in 1927. The legislation was necessary because of a breakdown of rural municipal governments in certain areas of Alberta. This Act provided for the

administration of municipal areas which found themselves in financial straits resulting from crop failures and extensive farm abandonment. A Special Areas Board was appointed by the provincial government and given wide powers including the control of tax delinquent lands. The Board has authority: to require the adoption of approved farm practices and may make arrangements for the establishment of community pastures as well as individual leases; to take title to tax delinquent lands and to prevent these lands from being used for crop production; to supervise publicly owned lands in the Special Areas; to control the money spent for public purposes in these areas. It operates within the jurisdiction of the Minister of Lands and Mines.

Wide powers over the administration of these special districts were placed in the hands of the Minister of Lands and Mines so that the intent of the legislation—the rehabilitation of the drought-ridden areas of the province in order to achieve a greater diversity of occupation and more stability of income for those remaining on the land—might be carried out. Subject to the direction of the Minister, the Special Areas Board was assigned all the powers entrusted to the Minister.

A survey of the annual reports of the Board, embodied since 1939 in the Annual Report of the Department of Lands and Mines, discloses that the Board has been performing the regular functions of a municipal council in respect to the extensive areas under its jurisdiction: assessing and collecting of taxes on privately owned lands, building roads, maintaining schools, paying the hospital accounts of indigents, and contributing towards the payment of pensions for the old aged and the blind. In addition to performing these regular duties of a local government, the Board has leased crown lands for cultivation purposes and subsequently collected the rents and taxes. It has exchanged certain public lands within a Special Area for private lands within any of the Special Areas. The Board has set aside large areas of land, fenced them off and issued grazing permits (at a fee) for the pasturing of livestock thereon. It has co-operated with Prairie Farm Rehabilitation Administration on the construction of dams and dugouts. The Board has distributed large quantities of grass seed for soil conservation purposes.

Under an amendment to the Act in 1943 the Minister of Lands and Mines was given authority to provide for the setting up in any Special Area of an Advisory Committee chosen in the manner he prescribes. Section 4 states that "the functions of the Committee shall be to confer with and advise the Board as to matters affecting the special area for which it is constituted, and it shall meet when called by the Board".

Northern Areas Branch

The Northern Settlers Re-establishment Scheme was initiated by the Saskatchewan Government with the Federal Government contributing 50 per cent of the cost, during the period of drought and depression in Western Canada. The Northern Settlers Re-establishment Branch, now the Northern Areas Branch, was set up as a part of the Department of Municipal Affairs on September 1, 1935. Its purposes were to assist the new settlers and those on relief in Northern Saskatchewan to recover a self sustaining, self-respecting status. With this purpose in view the Branch took over from the Bureau of Labour and Public Welfare the administra-

tion and direct relief and agricultural re-establishment assistance in the northern areas. The re-establishment assistance to settlers had already been undertaken on a small scale by the Department of Natural Resources in connection with the 1931 Land Settlement Scheme and by the Bureau of Labour and Public Welfare under the Relief Settlement Plan. With a view to expanding re-establishment assistance the Branch was entrusted with the consolidated administration of both the 1931 Land Settlement Scheme and the Relief Settlement Plan.

The principle underlying re-establishment assistance is "self-help". Each settler is left to work out his own plan, which, if practical, he is expected to follow with the advice and help of a representative of the Board. The actual re-establishment of settlers was begun in July, 1936. The expenditures involved such items as live stock equipment, land breaking, feed, building materials, fencing materials, transportation of settlers and effects, sundries, drainage, surveys, brush cutting and breaking equipment.

The Branch, with the co-operation of the Department of Agriculture in an educational campaign stressed mixed farming as the type of agriculture most suited to Northern Saskatchewan.

The Saskatchewan Land Utilization Board

A Land Utilization Board was appointed by the Provincial Government of Saskatchewan in 1935 to administer the Dominion Utilization Act. This board has the power to take title to tax delinquent land and to hold such land from cultivation. It may also prevent the settlement of new land deemed unsuitable for cultivation, and may designate areas of land submarginal for grain production. The Board was empowered to declare any land within the portions of the province which were designated as "areas" by the Lieutenant Governor in Council to be unsuitable for agricultural purposes. In respect to land so declared the Board was specifically given the following powers:

- (a) to lease such land at rentals, including taxes, which it deemed advisable;
- (b) to receive moneys payable by lessees of such public lands and to spend the same for the betterment of the district in which the lands are situated and particularly for the purpose of investigating the means of water supply and procuring a suitable supply;
- (c) to set aside any public lands for the purpose of community grazing (sec. 12 authorized the Board to define what persons could use such land, the number and kind of animals each could have thereon, the grazing fees to be imposed, and to regulate in general the operations of such projects).
- (d) to exchange for lands within an "area" any other lands whether within an "area" or not.

In addition to these powers the Lieutenant Governor in Council could delegate, if deemed advisable, to the Board all or any of the following powers:

- (a) The authority to order a compromise on any taxes in respect of any land in an "area", and to fix the amount which would be accepted in full satisfaction of such taxes and the manner in and

the times at which the amount so determined was to be paid;

- (b) to order that from a specified date any rural municipality within an area shall be dissolved, and, upon dissolution, exercise all the powers hitherto enjoyed by the local authority, including the enforcement of the payment of taxes and the recovery of moneys owing to the municipality;
- (c) to arrange for the payment of any debenture indebtedness of any school district within an "area", or such portion of such indebtedness as may be agreed upon with the debenture holders, such payment to be made out of revenues from leases granted under the authority of this Act.

Besides bestowing upon the Land Utilization Board the powers described above, the same Act authorized the Lieutenant Governor in Council to "direct that any public lands shall be dealt with in such a manner as appears to be advisable for the benefit of the residents of the area in which the lands are situated", to close up road allowances within any "area", and "generally do all such acts and things as may be deemed necessary or advisable for carrying out the purposes of this Act".

The original Land Utilization Act, passed in 1934-5 session of the Saskatchewan Legislature, has subsequently been amended during every session since, including the 1944 session with the exception of that held in 1942. The 1936 amendment added to the Board's powers, the authority to extend any moneys appropriated to it by the legislature; hitherto it was restricted to spending the revenue arising out of leases on the land under its jurisdiction. The 1937 amendment gave the Board additional authority to "aid in the removal and transportation of occupants of lands which in the opinion of the board are unsuitable for agricultural purposes".

The same amended Act gave two significant powers to local government authorities when, first, it authorized the reeve of any municipality or any other person acting with the authority of the council and subject to the approval of the Provincial Minister of Agriculture, to prohibit any farmer from undertaking operations which might cause injury to surrounding crops, and second, it authorized the council of any municipality to pass a by-law requiring farmers to adopt such methods of operation as were deemed necessary for the purpose of preventing soil drifting (all orders issued pursuant to such by-law being subject to the approval of the Minister of Agriculture).

FARM CREDIT

Two factors have contributed to the farm credit situation in Canada:

- (1) Farming has particular credit needs that differ from the requirements of industry and trade, for which our financial institutions primarily have been developed. Farming is characterized by small units; individual ownership; seasonality of production; production fixed by life cycle of livestock and weather; low returns and slow turnover; slow adjustments of production; and fluctuating prices. In contrast there are in industry and trade large units; corporate owner-

ship; possible continuous operations; quick turnover; larger returns and comparatively ready adjustment of volume.

- (2) The rapid expansion of agriculture before and after World War I, especially in the Prairies, resulted in farmers taking on a heavy debt load in connection with the purchase of land, implements, stock, and building materials. The mortgage was the chief instrument of farm finance, and in the absence of any special flexibility of repayment arrangements, the large volume of borrowing implied heavy fixed charges which had to be met out of an income which was and is extremely variable.

Prior to World War I, farmers found it difficult to get adequate credit. Repeated appeals were made for government assistance. Then, as prices declined in the Twenties, farmers found it difficult to meet their liabilities. Out of such situations arose the demand that the Dominion and Provincial Governments should step in and (1) supply farm credit in a large volume, to meet existing needs and re-finance existing debt; (2) make credit available at lower interest rates; (3) permit smaller payments, by extending the term of the mortgage over a longer period of years.

Although governments did not begin lending to agriculture on business principles until the second decade of this century, they have always played an important part in the promotion of agriculture and the extension of emergency financial difficulty wherever necessary. The development of government agricultural credit in Canada, that is, the organization of loaning institutions for the exclusive purpose of providing various types of credit to farmers, is comparatively recent.

Several Provincial Governments initiated agricultural lending activities just before or during World War I, owing to the continued demand for more abundant funds at lower rates of interest; the need for more specialized credit facilities; and the pressure of economic circumstances and conditions. Between 1912 and 1922, long-term or short-term credit loaning agencies were organized under provincial legislation in seven out of the nine Provinces of the Dominion.

The farm mortgage lending agencies set up were the British Columbia Agricultural Credit Commission, the Ontario Agricultural Development Board, Manitoba Farm Loans Association and Saskatchewan Farm Loan Board. In Alberta the Alberta Farm Loan Act, which was passed in 1917, was not put into operation. Legislation providing for the formation of rural co-operative credit societies, to serve as source of short-term operating credit to farmer members, was passed in three Provinces. There were formed: the Manitoba Rural Credit Societies, the Alberta Co-operative Credit Societies, and the Ontario Farm Loan Associations. All of these systems have ceased active lending, with the exception of the Alberta Co-operative Credit Societies which still operate as members of the Alberta Rural Credit Corporation, created to supervise and co-ordinate their activities.

In 1929 the Federal Government, through the Canadian Farm Loan Board, commenced to make long-term loans in six Provinces, three of which, Nova Scotia, British Columbia, and Manitoba, ceased to make loans under their own schemes. In 1935, after the Canadian Farm Loan Act had been amended, the Provinces of

Saskatchewan, Ontario and Prince Edward Island came under the provisions of the Act. The Canadian Farm Loan Board then operated in all nine Provinces, and was the sole government agency to make long-term loans to Canadian farmers.

The failure of the Provincial systems was the result of a combination of external agricultural conditions and internal weaknesses. Some of the weaknesses in the Provincial loaning system that led to failure or liquidation were (a) the risks were distributed in one Province only: the loaning field was too limited, and general crop failure in a Province made it difficult for successful collections by the Provincial Board; (b) adequate loaning funds, particularly in times of depression, were lacking, owing to the financial difficulties of Provincial Governments during such periods; (c) a large number of the loans made were used to pay off prior mortgages, many of them already badly in arrears, held by private individuals and mortgage companies, or simply to consolidate all outstanding debt: funds used for these purposes were not put to productive use; (d) lack of proper supervision; (e) the field staff was inexperienced in farm loan work; (f) loans were often too high in relation to the farmers' ability to repay, and many loans were made on subsistence farms—the Provinces did not have the authority to compel debt adjustment.

The Canadian Farm Loan Board at present carries on loaning operations throughout Canada and for this purpose has established a Branch Organization and Branch Office in each Province to handle the business arising in such province.

Under the provisions of the Canadian Farm Loan Act, the Board is constituted as a public corporation and an agency of the Dominion Government. Its powers and duties may be stated generally to be the making of long term loans to farmers on the security of mortgages on farm lands.

First mortgage loans may be granted for any term not in excess of 25 years with privileges of repayment. On loans made prior to April 1, 1945, the rate of interest is 5 per cent per annum with a rate of 5½ per cent on arrears. Loans made for a term in excess of five years are repayable in equal annual or semi-annual instalments of combined principal and interest on an amortized plan of repayment. Additional advances may be made for a term not in excess of six years on the security of second mortgage. The rate of interest on second mortgage loans made prior to April 1, 1945, is 6 per cent per annum.

On new loans made after April 1, 1945, the rate of interest on first mortgages is 4½ per cent per annum with a rate of 5 per cent in arrears; on second mortgage loans, the rate of interest is 5 per cent per annum on indebtedness, current and on arrears. The purposes for which loans may be granted are for farm improvements, including the erection of buildings, the purchase of live stock and equipment, farm operating expenses, purchase of farm lands and the refinancing of existing farm indebtedness. It should be noted, however, that a second mortgage loan cannot be made for the purpose of purchasing farm lands.

There has been a large decrease in the number of applications for loans during the last few years. The main factors affecting the decrease in new business offered to the Board during these years were: Firstly,

the increased ability of farmers to finance their outstanding short term obligations from current farm revenues has reduced the volume of mortgage credit required for the refinancing of short term accounts; Secondly, increased building costs and the difficulties of obtaining building material have served to limit building improvements and new construction and the consequent need for mortgage credit to finance such improvements; Thirdly, the present comparatively low interest yield from Government bonds has made farm mortgages yielding 4.5 and 5 per cent, an attractive investment for private funds and consequently considerable local money, which formerly was invested in Government bonds, is now being loaned on farm mortgages. Moreover, due to lack of adequate publicity many farmers are unaware of the fact that mortgage credit can be obtained through the facilities of the Board.

The Federal Government entered the field of farm credit after years of constant demand and appeal. Under the original organization of the Canadian Farm Loan Board both the Dominion and Provincial Governments as well as the borrowers subscribed for a small portion of the capital stock in the Board and the Board appointed Provincial Boards through which it was to function locally. However in 1935 the Dominion Government became the sole shareholder and the dual control element was removed by the substitution of a chief executive officer, appointed by the Board with the approval of the Governor in Council, in each Province in place of the Provincial Board. The original Act required the passing of enabling provincial legislation before lending could be commenced but in 1935 the necessity for such enabling legislation was done away with.

In the Province of Quebec prior to 1929 there was no Government agency for providing agricultural long-term credit. The Canadian Farm Loan Board established a branch office in Quebec in 1929 and in 1931 the Quebec legislature enacted legislation empowering the Provincial Government to contribute part of the interest payable by Quebec borrowers up to $1\frac{1}{2}$ per cent, thus reducing the rate of interest payable by Quebec borrowers from the Canadian Farm Loan Board from the rate of $6\frac{1}{2}$ per cent current at that time to 5 per cent.

In 1935, when the rate of interest on all Canadian Farm Loan Board mortgages had been reduced to 5 per cent, the Quebec legislature by further enactment empowered the Provincial Government to contribute up to 2 per cent of the interest payable by Quebec borrowers, thus reducing the interest payable by such borrowers to 3 per cent.

In addition to the credit supplied by the Canadian Farm Loan Board, and in order to meet the demand for long-term loans on easier terms of repayment and on a higher ratio in relation to farm values than that available from the Canadian Farm Loan Board and to facilitate refinancing indebtedness, the Province of Quebec has established its own farm credit scheme by the creation in the fall of 1936 of the Quebec Farm Credit Bureau which commenced operations in March, 1937.

To provide intermediate term credit, the Dominion Parliament amended the Bank Act, (August 9, 1944) and passed a "companion" Act, the Farm Improvement Loans Act, 1944 (August 9). By amendment of the Bank Act, the chartered banks are authorized to make loans to farmers for the purchase of farm machinery and live stock; the installation of agricultural equipment or a farm electric system; the erection of fencing or works for drainage; the construction, repair, alteration or extension of any building or structure on a farm; and any work for the improvement or development of a farm designated in the regulations. Security may be taken on agricultural implements, equipment and farm electric systems. Under the terms of the Farm Improvement Loans Act, the government guarantees the chartered banks against loss up to 10 per cent of the amount loaned by it under this Act. As a whole, the guarantee applies to an aggregate total of \$250,000,000 for banks provided the loans comply with certain regulations: (1) they must be made within a period of three years from the commencement of the Act; (2) the maximum loan is \$3,000; (3) the rate of interest must not exceed 5 per cent; (4) the term is not to exceed 10 years. On loans in excess of \$2,000, and repayable in more than five years, the bank may take a mortgage on the farm property as security.

PART II

CONSERVATION AND DEVELOPMENT

1. FOREWORD

The following reference material on the conservation and development of agricultural resources was compiled under the direction of the Sub-Committee on Agriculture and Combined Resources. The Sub-Committee was requested in the case of Prairie Farm Rehabilitation in particular, to prepare factual material describing the principles and methods of co-operation with provincial governments that have been worked out and followed.

In view of the fact that the various activities of both the Dominion and Provincial Departments of Agriculture are described in Part I of this volume and because it is not practical in many cases to describe separately such activities as relate in some measure to the conservation and development of Agricultural resources without an undue amount of duplication, it was decided to deal only with Prairie Farm Rehabilitation activities in this section. Other conservation and development activities are mentioned in Part I of this volume.

2. THE PRAIRIE FARM REHABILITATION ACT

The Prairie Farm Rehabilitation Act was passed by the Parliament of Canada in April, 1935, to provide for the rehabilitation of the drought and soil drifting areas of the Provinces of Manitoba, Saskatchewan and Alberta.

By the passing of this Act and the various activities that were initiated as a result, Federal aid through the Dominion Department of Agriculture was made available on an extensive scale for restoring and improving agriculture on prairies that had been so hard hit by years of drought. Equally important was the fact that a set up or organization was provided by which all existing agencies could and were effectively co-ordinated for the common purpose of overcoming the problems of drought.

The Act makes no attempt to define or lay down policy except in a very general way, thus affording scope and flexibility in all activities carried on under its provisions. The Act as first passed provided for cultural work and water development. An amendment in 1937 provided for land utilization and community pasture development.

COMMITTEES UNDER THE ACT

The Act provides for the appointment of one or more Advisory Committees as the Minister of Agriculture may deem necessary. In addition to the Administrative Committee, consisting of three members and headed by the Deputy Minister of Agriculture, there are at present two Advisory Committees. The Advisory Committee on Land Utilization is the principal advisory body now functioning under the Act. This Committee, which is headed by the Director of the Experimental Farms Ser-

vice, is made up of representatives from the Dominion Department of Agriculture, each of the Prairie Provinces, each of the rural municipal associations in Manitoba, Saskatchewan and Alberta, the Canadian Bankers' Association, the Canadian Pacific Railway, the Canadian National Railway, the Dominion Mortgage and Investment Association, and the Hudson's Bay Company.

There is also an Advisory Committee on Water Development on which there are representatives from the Water Administration Offices in each of the Prairie Provinces and the P.F.R.A. office. The Water Development Committee was at the outset very active but its function is now very largely served by the other Committees and members of the Water Development Committee frequently meet with the Land Utilization Committee.

MAIN DIVISIONS OF P.F.R.A. WORK

The activities of the P.F.R.A. are generally grouped under the main headings of (a) cultural work, (b) land utilization, and (c) water development.

(a) *Cultural Work*—

The main objective in cultural work is to give technical help and leadership in soil conservation and especially the control of soil erosion by the use of improved cultural methods. The regional cultural activities of P.F.R.A. are carried on through the Dominion Experimental Stations located in the P.F.R.A. area and include the supervision and direction of district experiment substations, reclamation of badly drifted land, regrassing, and providing leadership for agricultural improvement associations. Special cultural activities include tree planting, soil research, soil surveys and economic surveys.

(b) *Land Utilization*—

In land utilization work the object is mainly to develop community pastures on lands that have been found unsuitable for farming purposes owing to soil and climatic conditions. This activity also includes the relocation of settlers, from areas where community pastures are established, to other areas, including irrigation projects.

To date some 72 community pastures have been completed, mostly in Saskatchewan. These vary in size from 5,000 acres to 170,000 acres and comprise a total of nearly one and a half million acres of sub-marginal land.

During the six-year period 1938-1944 more than a quarter million animals were handled in these pastures including 166,262 cattle, 60,665 horses and 27,194 sheep.

Some 110,000 acres of go-back land have been regrassed and more than a half million pounds of crested wheat grass were harvested and made available for distribution.

(c) *Water Development*—

In water development engineering and financial assistance have been provided through P.F.R.A. in completing nearly 25,000 small projects (not including the current year) in the three Prairie Provinces, including dugouts, stockwatering dams and individual irrigation projects. This assistance has been on a self-help basis where the farmers benefited make a substantial contribution towards the cost of construction.

The water development program also provides for the engineering and construction of large projects either for irrigation or community water supply. Existing irrigation projects have been given assistance, new projects have been created, and a number of storage dams have been completed, while the engineering staff has devoted much time to the study of projects for post war development.

All irrigation projects constructed on the Prairies during the past 45 years or more have not been successful. Nevertheless the major projects have for the most part succeeded in good measure and the operation of these projects has contributed enormously to the agricultural production and general welfare of the regions served. Furthermore the undeveloped waters of the prairie streams and smaller run-off areas need to be regarded as part of our agricultural resources that need to be fully developed as part of any comprehensive rehabilitation or conservation program.

SUMMARY OF P.F.R.A. RESULTS

P.F.R.A. has now been in operation for a full decade and some appraisal of results is possible. The cultural work has benefited directly or indirectly more than 12 million acres of farm land on the Prairie and possibly as much as one million acres have been affected by regrassing work. A by-product of this work is the export of some 3,000,000 pounds of seed, including crested wheat grass, brome and sweet clover. Tree planting as part of home building and providing shelter belts has been greatly stimulated.

Individual or small water development work is directly benefiting some 25,000 farmers, not including the current season's work, while thousands more are being benefited by community projects. These projects have played a major part in the agricultural contribution of the Prairies to Canada's war effort and their role is no less important in providing water for household use, and for cattle, hogs and poultry during peace.

Regrassing work under the P.F.R.A. has benefited thousands of farmers and hundreds of ranchers, while the establishment of community pastures on a large scale is an outstanding development in prairie agriculture.

There have been definite improvements in livestock in the communities served by pastures while the restoration of wild life such as waterfowl and upland game that has taken place in the community pastures and other P.F.R.A. projects should be of benefit to the regions served.

3. DIVISION OF RESPONSIBILITY AND PROCEDURE IN P.F.R.A.

The division of responsibility in P.F.R.A. as between the Dominion and the Provinces, as well as other

agencies, including colleges and municipalities, has been determined for each activity or phase of activity according to existing conditions and circumstances. The object of the P.F.R.A. setup has been and is to encourage co-operation and a willingness to work together in achieving a common purpose.

Detailed statements on the division of responsibility are presented below for (1) Cultural Work, (2) Land Utilization, and (3) Water Development.

CULTURAL WORK

It was but natural that the Dominion Experimental Farms should assume the major responsibility in cultural aspects of P.F.R.A. because of their long experience in agriculture in the drought area, through which a specialized staff was built up in the large number of divisions of work embodied in the Cultural Section.

The Cultural program might be roughly divided into three main objectives, namely the control of soil drifting, reclamation of drifted land, and the improvement of production and living conditions on Prairie farms.

Reference is here made to the Publication of the Dominion Department of Agriculture entitled "P.F.R.A. A Record of Achievement" being a summary of P.F.R.A. work for the eight-year period ending March 31, 1943.

Soil Drifting Control

This work was based on experiences and experiments of farmers and Dominion Experimental Farms in the vicinity of Lethbridge as well as results of cultural experiments on all the Dominion Experimental Farms in the Prairie Provinces. However, to discover the applicability of these measures the Dominion Government, without any formal co-operation from the Provinces, established some 50 District Experiment Substations on different soil types and under different climatic conditions. The success of measures such as strip farming, ploughless fallow, trash cover, cloddy culture, cover crops, and types of machinery different from those commonly used were thus proven.

Agricultural Improvement Associations

Farmers formed themselves into community organizations which were termed "Agricultural Improvement Associations" in order to take united action. These Associations or A.I.A.'s, were formed with the knowledge of the Provincial Departments of Agriculture and frequently with assistance from the few agricultural representatives.

In emergency areas where local equipment was inadequate the Experimental Farms, in addition to supplying the customary technical advice, supplied newer equipment such as listers, lister shovels for cultivators, etc., to assist the farmers. This too was done without aid from the Provinces.

Reclamation

Land reclamation included both demonstration and co-operative assistance. Many demonstration blocks of land were obtained from the municipalities. Soil drifting control measures were adopted toward the establish-

ment of permanent grass sod. This proved so highly successful that many municipalities asked for guidance and co-operation. In consequence, a large number of municipal reclamation projects were completed. The P.F.R.A. Cultural Section did the most of the work, municipalities providing the land and a guarantee that this land would be kept out of cultural agriculture and would be administered by the municipality for community grazing purposes. A somewhat similar arrangement was also made with the Special Areas Board of the Province of Alberta, within which some 150 such grassing demonstrations were conducted.

Regrassing

Regrassing technique was worked out on the Dominion Experimental Farms and District Experiment Substations, including species and varieties of grasses and clovers and dates and methods of seeding, in which the P.F.R.A. assumed the full costs and responsibility.

Regrassing was further encouraged through the 32,000 members of some 229 Agricultural Improvement Associations by the free distribution of certain quantities of grass seed and legume seed with the understanding that this was to be bulked by the members for their own farms and surpluses made available to neighbours.

Regrassing was done on a large scale as well as hay and seed harvesting by the Cultural Section for the Land Utilization Section on Community Pastures. This was entirely Dominion work.

Grazing surveys to determine the carrying power of pastures and ranges, the advisability of reseeding programs and determining the optimum carrying power under normal and abnormal conditions, were inaugurated and conducted on several million acres entirely by the Cultural Section of P.F.R.A.

Tree Planting

Tree planting on the Prairies is an old established Dominion activity centering around the two Dominion Forestry Nursery Stations under the Dominion Experimental Farms located at Indian Head and Sutherland, Sask. Under P.F.R.A. the tree planting program took on new aspects other than that of home shelters. Encouragement has been given to farmers individually and through the A.I.A.'s to plant trees around dugouts, small stockwatering dams and small irrigation projects both for protection and the accumulation of snow for runoff collection.

In addition four large Field Shelterbelt demonstrations were established involving the planting of over one million trees with the co-operation of the farmers, which are the basis of the present study of the value of trees in controlling soil erosion, retarding moisture evaporation, etc. All these tree planting programs were purely Dominion expenditures and undertakings. Roughly 17,000,000 trees have been supplied for P.F.R.A. work.

Soil Surveys

For nearly 20 years the Dominion Department of Agriculture through the Experimental Farms has co-operated closely with the Soils Departments of the Universities. Because of the urgency of a more com-

plete picture of soils classification and the determination of land use on the Prairies the Cultural Section of P.F.R.A. speeded up this work and contributed much more than the customary equal share of costs in staff and other expenses. This close co-operation, which at the same time allows full latitude for both the Dominion government and the universities to expand their work, has been continued on that basis on nearly 100 million acres.

Economic Surveys

The same agreement and co-operation exists between the Division of Agricultural Economics, Dominion Department of Agriculture and the three provincial universities. Economic surveys based on reconnaissance soil surveys have been undertaken throughout a considerable portion of the P.F.R.A. area to secure information needed in readjusting prairie agriculture so that farmers may secure better net incomes and greater security. These land use studies also provide a guide to those responsible for administering rehabilitation policies, for levying of assessments and for land appraisal, and other purposes. More than 25 million acres of land have been classified in Alberta and Saskatchewan.

Entomological Surveys

Although the entomological surveys in the P.F.R.A. area are financed through regular departmental funds of the Science Service, Dominion Department of Agriculture, yet during the period of greatest severity of outbreaks of insect pests, P.F.R.A. funds were used on special work to supplement departmental activities.

Plant Disease Surveys

This work was done almost entirely by the Science Service of Dominion Department of Agriculture with no aid from the Provinces, universities or P.F.R.A.

Soils Research

The field of soils research up to the limit of personnel available under war conditions is co-ordinated through a National Soils Committee and problems are apportioned amongst the 4 laboratories in the Prairie Provinces, namely the Soils Laboratories at the three Universities and the Dominion Soils Laboratory at the Experimental Farm, Swift Current, Sask. Specific soil research problems are undertaken at the universities with Dominion assistance.

Forage Crop Breeding and Promotional Work

In order to face special drought conditions new and more drought resistant species and varieties of grasses and clovers were necessary. Plant breeders of the three universities and all the Prairie Experimental Stations and Laboratories have been working on this problem for many years and determined regional adaption of existing varieties. They have carefully studied many of the newer types of grasses recently imported. Amongst these was crested wheat grass introduced and proven under Prairie conditions simultaneously by the Forage Crop Laboratory at the University of Saskatchewan and the Dominion Forage Crop breeders at Swift Current and

Manyberries. In the propagation of this and other species of grass now so widely used, the Dominion Forage Crop Laboratories at the University of Saskatchewan and Swift Current gave leadership.

Cereal Research

Here again the universities and the Dominion Experimental Farms and Science Services are kept in harmony and work unitedly as one group of workers through research committees. The rust resistance of wheat which had been established before P.F.R.A. was created has been a protective agent in all P.F.R.A. work, but other diseases were making continuous inroads into production, such as other wheat diseases, the various rusts of oats, barley and flax, root rots of cereals, wilt in flax, and the ever-increasing inroads of insects, including wheat stem sawfly, cut worm, wire worm, grasshopper, etc. Plant breeders, located mostly at the Dominion Rust Laboratory at Winnipeg, the Experimental Farms at Brandon, Indian Head and Swift Current, and Plant Pathologists from Dominion Science Service have made enormous contributions toward solving these problems, hence materially reducing the risks of production in the P.F.R.A. area. The scientific leadership of the Cereal and Botany Divisions, Ottawa, has been invaluable in this work.

Dominion Entomology Research and Services

The excellent contributions of Entomologists in the P.F.R.A. area are well known. Outstanding are surveys, assistance in organizing control measures of grasshoppers, cut worms, wheat stem sawfly and warbles in cattle.

The P.F.R.A. Cultural Section contributed in both research and services.

Summary

It will be seen from the above that the Dominion Department of Agriculture, because of its organization, the location of its various units and specialized training of men, was in a position to give major leadership in all the sections of cultural work under the P.F.R.A. program.

In the above, complete harmony existed and recognition and evaluation of this work by the Provinces was attained through the Advisory Committee on Land Utilization, P.F.R.A.

LAND UTILIZATION

Community pasture development under the P.F.R.A. dates back to 1937 when the Act was amended to provide for land utilization and the rehabilitation of sub-marginal areas on a community basis.

The procedure and division of responsibilities in respect to this work were from the outset defined by written agreement and this phase of P.F.R.A. is confined to those Provinces, namely Saskatchewan and Manitoba, that have so far entered into agreements with the Dominion. In this connection Alberta has been following its own land utilization policy which has been in force for some years.

Former P.F.R.A. Agreement with Saskatchewan

The agreement entered into between the Dominion and the Province of Saskatchewan (January 5, 1938) and which was in effect until 1943, when it was terminated by letter from the Province, set out very clearly the division of responsibility between the Dominion government and the Province.

Following are the main conditions set out in the agreement:

1. The Province was to submit proposals for projects concerning community pastures, grazing reserves, and irrigation works to the Dominion for its approval and to designate in such proposals the areas which, in the opinion of the Province, were suitable for such projects; and further that the Province would, so long as the Dominion continued to make expenditures for these purposes within the area covered by the agreement, continue from time to time to submit proposals for projects of its character.

2. The Province was to submit such proposals or submissions in writing and as far as possible and practical these were to be accompanied with the fullest information respecting the ownership of the lands contained within the proposed areas together with particulars of actual settlement and such other information as would assist the Dominion in determining whether or not the proposed project was feasible.

3. If the project was approved the Province would, immediately upon request of the Dominion, either lease to the Dominion at a nominal rental or transfer to the Dominion for a nominal consideration, at the option of the Dominion, all lands within the proposed area, the title of which was in the Province, and where any such lands were subject to lease the Province at the request of the Dominion agreed to terminate such leases and the Dominion to pay any compensation awarded to the claimant.

4. The Province would, at the option of the Dominion, lease or transfer to the Dominion any lands within a project, title of which was acquired through the Land Utilization Act by the Land Utilization Board, and further where a municipality had title to land required for a project that could only be handled through the Land Utilization Board, the Province agreed, upon request of the Dominion, to arrange with the municipality to lease at a nominal rental or transfer for a nominal consideration, at the option of the Dominion, such lands to the Dominion. Similar arrangements applied in the case of lands held by the Department of Municipal Affairs.

5. In the case of lands held by private persons, firms or corporations, the Province was to use its best endeavours to acquire title by exchanging for other crown lands elsewhere within the Province and upon acquiring such title the Province agreed to lease or transfer such lands to the Dominion.

6. In the case of owners residing on lands required for a project, the Dominion was to arrange, if necessary, for the transfer of such owners to other lands for resettlement, and where expedient these settlers were to be moved onto land within the area or areas of other projects. Where transfer to such lands was not expedient the Province agreed, when requested by the Dominion,

to use its utmost endeavours to provide crown lands within the Province for the transfer of these settlers.

7. Where the only amicable way to acquire title to any lands required was to purchase, or where a lease had to be terminated, the Dominion was to conduct the necessary negotiations. The Province was to assist in such negotiations and also to transfer or lease to the Dominion any lands acquired.

8. The Province was to expropriate land where necessary and the Dominion was to pay the reasonable costs of such expropriation proceedings and any compensation agreed upon or legally awarded.

9. The Province agreed to assist in carrying out the policies outlined and to encourage settlers within proposed projects to move outside, within the vicinity or elsewhere.

10. The Dominion agreed, in the case of approved projects, to rehabilitate the areas through the development of community pastures, grazing reserves and irrigation projects, such development to include fencing, movement of buildings, regrassing, construction of roads, provision of water facilities, and other matters of a similar nature that were necessary to make operative the projects upon which expenditures were being made.

11. It was provided that the Dominion would control and provide through associations or otherwise in such manner as it might determine, the maintenance and management of the community pastures, and further that the Dominion would determine the areas to be grazed and would fix pasturage fees.

12. In the matter of disorganization of school districts or where telephone companies or other municipal bodies were involved or the right of creditors whose security was based upon the right to tax the land was affected and there were any claims, it was the stated policy of Dominion and the Province, as far as possible and practical, to settle such claims by mutual agreement between the parties involved on the understanding that any necessary expenditures would be borne by the Dominion to the extent only that the Dominion might deem proper.

In brief the agreement provided that the rehabilitation areas be brought under the control of the Dominion for the creation of community pastures, grazing areas and irrigation projects, and that the Province would make available the lands within approved areas, by transfer of title and by exchange of crown lands outside the approved area for privately owned lands within approved areas.

All P.F.R.A. community pastures in Saskatchewan were initiated and constructed under the terms of this agreement.

Termination of P.F.R.A. Agreement with Saskatchewan.—The procedure and arrangements worked satisfactorily except in the matter of land control, including school lands held in trust, and the Province advised the Dominion by letter dated February 22, 1943, that the Government of Saskatchewan could not continue to operate under the agreement of January 5, 1938, inasmuch as it could not continue to submit proposals to the Dominion when it had a full realization of its inability to meet the conditions of the agreement owing to the fact that the necessary lands were no longer available.

The Province indicated in this letter: 1. that it was prepared to continue making provincial crown lands within an approved area available to the Dominion for community pasture purposes. 2. That it would be in keeping with the letter and spirit of the School Lands Trust to make school lands within an approved area available by lease to the Dominion upon payment by the Dominion of the grazing lease fee of 2 cents per acre per annum; and 3, that it would not be possible for the Province of Saskatchewan in any future proposals submitted to provide lands for exchange of privately owned lands.

New P.F.R.A. Agreement with Saskatchewan under negotiation.—Negotiations are under way between the Dominion and the Province of Saskatchewan in respect to a revised agreement covering community pastures, particularly to overcome the difficulty caused by the fact that Saskatchewan has no further crown lands available for exchange purposes.

Dominion—Manitoba Agreement on Community Pastures.—The Province of Manitoba and the Dominion entered into an agreement on September 15, 1939, in respect to the establishment and operation of community pastures in Manitoba.

This agreement with Manitoba is similar in general outline to the former Saskatchewan agreement but the provisions with respect to land control are different.

In the Manitoba agreement the Province agrees to lease lands to the Dominion at a nominal rental or secure and assign leases, and renewals if any, to the Dominion for the duration of a pasture which is generally a period of 21 years. However, the Province does not agree and is not required to transfer title of such lands to the Dominion.

Another difference between the two agreements is that Manitoba has assumed a greater degree of responsibility than was the case in the Saskatchewan agreement in securing leases for lands needed in connection with approved pastures.

The agreement sets out that if the Dominion approves of a proposal submitted by the Province, the Province will then proceed to obtain control of the necessary lands, as defined in the agreement, and when such control is obtained, the Province will lease these lands to the Dominion at a nominal rental.

The Manitoba agreement sets out the following provisions for making land available for community pasture purposes.

- (a) "With respect to lands the title to which is in private persons, firms or corporations, the Province may acquire title of such lands by exchange of title with the owners of crown land elsewhere in the Province; and if the Province does not acquire title in this way the Province will take a lease of such lands from the owners for the period of the pasture, paying the rent and taxes if any, and will assign the said leases, and renewals if any, to the Dominion for the duration of the pasture.
- (b) With respect to lands referred to in the foregoing paragraph the owners of which are living on such lands, the Province may where possible provide crown lands elsewhere within the Province to which the said owners may be satisfactorily transferred, the cost of resettlement to be borne by the Dominion.

- (c) With respect to lands the control of which cannot be acquired by the Province except by lease, the Province or the interested municipality on behalf of the Province, will conduct the negotiations with respect to such leases and pay the cost thereof and where leases covering such lands have to be terminated the Province or said municipality will pay such compensation, if any, as may be agreed upon or as may be legally awarded to the claimant.
- (d) With respect to provincial lands which have been leased, the Province, at the request of the Dominion, will terminate such prior lease and, if such termination involves any claim for compensation, such claim shall be referred to the Dominion and the Dominion will pay such compensation, if any, as may be agreed upon.
- (e) With respect to lands the title to which is in a municipality, the Province will acquire such lands by lease from the municipality."

The Dominion agrees, when the Province has fulfilled its part of the agreement, to proceed to rehabilitate any designated and approved areas through the development of community pastures, such development to include fencing, movement of buildings, regrassing, construction of roads, provision of water facilities, and other matters of a similar nature which should naturally be carried into effect to make operative the projects upon which expenditures are being made.

The Dominion controls and operates the pastures except that in the case of pastures of less than 10,000 acres the Dominion may at the request of the municipality in which the proposed pasture is situated allow such municipality to retain the control, maintenance and management of the pasture.

The agreement sets out that the Dominion shall in no way be held liable for any claim resulting from the disorganization of school districts, or telephone companies, or other municipal bodies in the Province or from the rights of creditors whose security is based upon the right to tax the land.

Summary on Land Utilization

At present six community pastures are in operation in Manitoba including a total area of 122,460 acres which the Dominion controls by 21-year lease from the Province of Manitoba. In Saskatchewan there are 66 P.F.R.A. community pastures in operation including a total area of 1,205,100 acres. The Dominion has received transfer of title to 922,617 acres or 76.6 per cent. The Saskatchewan Land Utilization Board has title or is definitely getting title to 150,803 acres or 12.5 per cent, and in addition the Board holds 10-year leases on 113,440 acres or 9.4 per cent, while there are 18,240 acres or 1.5 per cent of the total pasture areas which is not controlled.

Land control is obviously a major factor in community pasture development as well as in other phases of P.F.R.A. work, such as large irrigation development and some phases of cultural work, especially land reclamation, where it is essential to keep certain areas permanently in grass to prevent soil drifting spreading to nearby good land.

New pasture development under P.F.R.A. is largely at a standstill and will remain so until a new agreement is reached with Saskatchewan and also an agreement with the Province of Alberta in respect to community pastures. There are extensive areas in Alberta where P.F.R.A. community pastures could be beneficially established.

WATER DEVELOPMENT

To obtain a clear conception of the procedure and division of responsibility as between the Dominion and the Provinces in respect to P.F.R.A. water development work it is essential to refer, if only briefly, to the beginning of this work on the Canadian Prairies and the passing of the Northwest Irrigation Act by the Parliament of Canada in 1896, which was made applicable to the Prairies. This Act with subsequent amendments provided for the control of all surface waters including the authorizing and licensing of all irrigation projects.

The Dominion also undertook under the former Department of Interior extensive surveys to locate and survey feasible irrigation projects while hydrometric surveys were conducted to measure the flow of prairie streams and determine the amount of water available for irrigation and other purposes. Through this service the Dominion government contributed very substantially to irrigation development on the Prairies.

Following the transfer of the resources to the Provinces in 1930 the responsibility of administering the surface waters in each of the Provinces of Alberta, Saskatchewan and Manitoba became a provincial responsibility and accordingly each of the Provinces established a separate water administration office. The Dominion only retained control of navigable waters and of these streams that were international in character and which came under the jurisdiction of the International Joint Commission.

The surface waters therefore were under the separate control of the three Provinces when the Prairie Farm Rehabilitation Act was passed in 1935. This divided control was fully recognized at the outset as a basic consideration in the organization of a comprehensive water development program.

It was first of all generally agreed, in so far as possible, that all formality should be dispensed with in the case of small projects and especially dugouts. At the same time it was recognized that in respect to the more elaborate types of project such as dams and irrigation works, where surface water is stored above ground level and flooding rights are involved, the laws respecting such projects had to be strictly adhered to.

Organization of Engineering Services

During the first year all P.F.R.A. water development work, including large and small projects, was centralized in the P.F.R.A. headquarters office. It was found, however, that this centralized control was too involved and caused needless inconvenience to applicants in complying with the water administration regulations in each of the Provinces. In order to correct this situation the Provinces were asked in 1936 to take over the supervision of the engineering staffs employed on small water developments. This was agreed to by each Province and as a result the procedure with respect to small water development was greatly simplified.

The arrangements made, and which are still in effect, provide that the engineering staffs employed on small water developments receive all instructions through the water administration office of the Province in which they are located, and applications received from farmers and ranchers for assistance in water developments requiring authorization under a provincial water rights or resources act are forwarded to the provincial office concerned for attention. When a project is finally completed by an applicant, the P.F.R.A. district engineer, working under the direct supervision of provincial water rights office, not only submits a certificate on which payment of financial assistance provided under P.F.R.A. is recommended, but also certifies to the provincial office that the requirements of the water rights Act of the Province have been complied with. This latter is in fact a condition of payment of any financial assistance from P.F.R.A.

In addition to the engineering staffs working under the provincial offices on dams and irrigation projects an agricultural staff is employed in connection with P.F.R.A. water development work. This agricultural staff works directly under the P.F.R.A. Central Office at Regina and all applications for assistance in water development are referred to the agricultural staff for appraisal as to possible agricultural value. All applications for assistance in connection with dugouts, which do not require authorization under any water rights act, are handled by the agricultural staff. The agricultural reports respecting dams and irrigation projects are forwarded to the Provinces concerned for attention of the engineers. The salaries and travelling expenses of the agricultural staff and engineering staff including those working under the Provinces are paid from P.F.R.A.

The engineering staff employed on large water developments are supervised direct from the P.F.R.A. Central Office. However, the P.F.R.A. engineering staff employed on large projects must of necessity keep in close and constant touch with each of the three provincial water administration offices since all projects excepting dugouts must be authorized under provincial law.

Dominion—Provincial Agreements on P.F.R.A. Water Development

Various agreements have been entered into between the Dominion and the Provinces as well as other bodies such as municipalities in respect to water development. The first document of this nature was the agreement between the Dominion and the Province of Saskatchewan dated January 5, 1938, and which was rescinded in 1943 for reasons already outlined.

While this agreement provided for the development of community irrigation projects it was intended and applied primarily to community pastures.

It has been the policy for the Dominion to either assume complete financial responsibility for a project such as in the case of Val Marie, Eastend and Maple Creek, and recover at least a portion of the capital cost through sale of developed lands, or else enter into contractual agreement with some legally organized body representing the individuals benefited. Such agreements set out any contributions the applicant is to make and obligations such as undertaking to maintain and operate the works when completed, and comply in every respect to the requirements of the water rights or resources Act of the Province where located.

Former Water Development Agreement with Saskatchewan

A new general water agreement between the Dominion and the Province of Saskatchewan has been proposed to replace the former agreement, described above under Land Utilization covering both community pasture and irrigation projects. It has been considered but negotiations have not yet been completed. In the meantime and until a general agreement is reached any large water development in Saskatchewan requires an individual contract for each project.

Water Development Agreements with Manitoba and Alberta

A general agreement in respect to water development was made between the Dominion and the Province of Manitoba on May 22, 1942. A similar agreement was made between the Dominion and the Province of Alberta on April 30 of the following year.

These two agreements covering large water developments serve to establish the responsibility of the Provinces in respect to the maintenance and operation of projects after being built under P.F.R.A. A condition of this undertaking on the part of either Province is that the responsibility for maintenance and operation will be assumed only when construction of the project has been recommended by the Province in the first place.

In brief these two agreements each provide the following main terms:

1. The Province may apply to the Dominion requesting the construction of any large or community water projects. The Alberta agreement refers to the enlargement or improvement of such projects.
2. The Dominion may after investigation and at its discretion reject or approve the application.
3. In the case of approved projects the Dominion undertakes to prepare plans and specifications and to apply for an interim licence under the provincial water rights or resources act.
4. The Dominion undertakes to make the necessary legal surveys and to file plans in the appropriate land titles office.
5. When requested by the Dominion, the Province will expropriate lands where needed for an approved project.
6. After the necessary terms have been complied with by the Province, the Dominion agrees to construct the works according to plans approved.
7. The Dominion undertakes to reimburse the Province for the cost of any necessary expropriations.
8. The Dominion undertakes to operate without cost to the Province each project for a period of one year after being completed, when the Province is to assume full responsibility for maintenance and operation.
9. When the Province assumes control the Dominion agrees to transfer to the Province any lands or interest in lands which it, the Dominion, may have acquired in respect to a project taken over by the Province.

In respect to the very large irrigation projects that are proposed and recommended for post-war development, it is generally understood that these will in each case be covered by contractual agreement.

PART III TABLES

NOTE.—Statistics in tables 1 to 14 inclusive do not necessarily agree with agricultural expenditures as shown in "Comparative Statistics of Public Finance" because of a different treatment of agricultural expenditures. Advances and loans and trust accounts are not included.

TABLE 1

NET EXPENDITURES IN AGRICULTURE

DOMINION AND PROVINCIAL GOVERNMENTS, COMBINED TOTALS
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — March 31 1934	1937 — March 31 1938	1939 — March 31 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I DEPARTMENT OF AGRICULTURE—							
A.	Administration.....	1,069	1,115	1,206	1,319	1,327	1,487
B.	Farms and Experimental Stations.....	1,686	2,480	2,356	1,880	1,641	1,718
C.	Extension Service.....	1,026	1,425	1,594	1,646	1,671	1,723
D.	Agricultural Colleges and Schools.....	1,080	1,387	1,394	1,358	1,162	1,291
E.	Live Stock and Poultry.....	3,561	4,261	5,001	5,303	5,343	5,727
F.	Dairying.....	727	820	874	3,795	4,499	3,626
G.	Horticulture.....	751	1,009	1,624	1,571	1,534	1,482
H.	Grants to Societies, Farmers' Clubs.....	344	399	423	391	394	397
I.	Exhibitions.....	621	636	636	271	246	260
J.	Other Agriculture.....	2,765	5,794	17,586 ¹	77,300 ¹	52,341 ¹	104,144 ¹
	Sub-Total.....	13,630	19,326	32,694	94,834	70,158	121,855
II EXPENDITURES IN DEPARTMENTS—							
	OTHER THAN AGRICULTURE.....	4,759	9,498	29,731	17,975 ¹	24,314 ¹	34,213 ¹
III AGRICULTURE RELIEF.....							
	Total.....	21,633	62,042	65,272	113,186	94,709	156,076

¹ Includes wartime expenditures.

TABLE 2
NET EXPENDITURES IN AGRICULTURE¹
PER DOLLAR CASH FARM INCOME
CANADA AND PROVINCES

Province	1933	1937	1939	1941	1942	1943
	c.	c.	c.	c.	c.	c.
Prince Edward Island.....	1.2	0.8	1.2	0.7	0.6	0.7
Nova Scotia.....	3.0	1.7	2.9	2.0	2.3	1.9
New Brunswick.....	3.3	2.6	2.9	1.8	1.5	1.4
Quebec.....	10.0	12.4	9.8	7.3	6.0	4.9
Ontario.....	1.6	1.0	1.0	1.9	1.5	1.5
Manitoba.....	1.0	0.8	0.7	0.4	0.3	0.2
Saskatchewan.....	3.4	23.7	1.2	0.3	0.3	0.2
Alberta.....	1.5	0.6	0.6	0.3	0.3	0.3
British Columbia.....	2.0	1.6	1.5	1.9	0.9	0.8
CANADA.....	2.5	4.2	6.7	10.3	6.9	9.8

¹ Current and capital accounts combined, relief and wartime expenditures included.

TABLE 3
NET EXPENDITURES IN AGRICULTURE PER FARM¹
CURRENT AND CAPITAL ACCOUNTS COMBINED
CANADA AND PROVINCES

Province	1933	1937	1939	1941	1942	1943
	\$	\$	\$	\$	\$	\$
Prince Edward Island.....	3.14	3.60	6.39	5.15	5.72	7.52
Nova Scotia.....	9.83	8.61	11.06	12.41	15.20	14.32
New Brunswick.....	6.82	9.44	10.89	10.79	11.64	13.05
Quebec.....	34.28	72.15	66.10	68.27	67.98	62.72
Ontario.....	11.22	12.03	12.22	29.88	30.58	32.67
Manitoba.....	5.90	9.81	8.27	4.95	5.12	4.95
Saskatchewan.....	18.57	140.75	13.87	3.93	4.11	3.91
Alberta.....	10.54	7.18	7.56	4.81	5.43	7.39
British Columbia.....	14.27	16.38	16.50	26.01	14.60	17.18
CANADA.....	13.38	36.80	66.49	128.96	103.74	187.74

¹ Relief and wartime expenditures included.

TABLE 4
NET EXPENDITURES IN AGRICULTURE PER CAPITA FARM POPULATION¹
CURRENT AND CAPITAL EXPENDITURES COMBINED
CANADA AND PROVINCES

Province	1933	1937	1939	1941	1942	1943
	\$	\$	\$	\$	\$	\$
Prince Edward Island.....	0.74	0.86	1.52	1.23	1.37	1.80
Nova Scotia.....	2.23	1.96	2.53	2.85	3.49	3.29
New Brunswick.....	1.30	1.82	2.11	2.10	2.27	2.54
Quebec.....	6.27	13.19	12.08	12.48	12.42	11.46
Ontario.....	2.76	3.00	3.07	7.56	7.74	8.27
Manitoba.....	1.28	2.19	1.88	1.15	1.19	1.15
Saskatchewan.....	4.55	35.47	3.61	1.06	1.11	1.06
Alberta.....	2.71	1.81	1.94	1.25	1.41	1.92
British Columbia.....	3.68	4.14	4.13	6.46	3.63	4.27
CANADA.....	3.04	8.44	15.33	29.87	24.03	43.49

¹ Relief and wartime expenditures included.

TABLE 5
DOMINION OF CANADA
NET EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED
(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — March 31 1934	1937 — March 31 1938	1939 — March 31 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	193	254	264	253	245	253
	B. Farms and Experimental Stations.....	1,498	2,187	2,148	1,662	1,463	1,552
	C. Extension Service						
	Publicity and Extension.....	25	78	145	118	102	103
	D. Agricultural Colleges and Schools.....						
	E. Live Stock and Poultry.....	2,813	3,405	4,000	3,285	3,231	3,285
	F. Dairying.....	248	349	410	397	381	393
	G. Horticulture.....	432	523	1,140	1,063	1,026	1,043
	H. Grants to Societies, Farmers' Clubs.....	21	51	24	24	24	24
	I. Exhibitions.....	360	308	403	67	65	65
	J. Other Agriculture						
	1. Cold Storage Warehouse.....	115	71	133	44	83	47
	2. Improvement of Cheese and Cheese Factories.....			644	1,676	1,963	1,599
	3. Agricultural Chemistry.....			101	99	95	90
	4. Agricultural Economics.....	10	76	103	89	82	85
	5. Entomology.....	71	555	507	456	431	454
	6. Marketing of Agricultural Products.....		305	111	25	24	24
	7. Plant Products.....	388	451	528	476	455	464
	8. Miscellaneous.....	600	43	876	57	32	62
	Sub-Total.....	6,774	8,656	11,537	9,791	9,702	9,543

TABLE 5 (Continued)

DOMINION OF CANADA

NET EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — March 31 1934	1937 — March 31 1938	1939 — March 31 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I	DEPARTMENT OF AGRICULTURE— <i>Concluded</i>						
	Agricultural Relief.....		11,406	456			
	Prairie Farm Rehabilitation.....		1,857	3,235	2,407	1,650	1,707
	Prairie Farm Assistance Act.....			7,767	12,270	394	2,789
	Wheat Acreage Reduction.....				30,634	25,628	30,788
	War Expenditures.....			1,376	25,789	18,084	62,366
	Sub-Total.....		13,263	12,834	71,100	45,756	97,650
	Total Department of Agriculture.....	6,774	21,919	24,371	80,891	55,458	107,193
II	DEPARTMENT OF FINANCE—						
	Agricultural Stabilization Fund.....	36					
	Expenses of Comptroller of Treasurer's Office.....	36					
	Farmers' Creditors' Arrangement Act.....		495	497	178	126	115
	War Expenditures.....				924	14,424	26,928
III	DEPARTMENT OF PUBLIC WORKS—						
	Agricultural Buildings (repairs, etc.).....	20	133	103	101	99	88
IV	DEPARTMENT OF TRADE AND COMMERCE—						
	Canada Grain Act.....	1,750	1,674	1,625	1,602	1,529	1,578
	Canadian Government Elevators.....			360	307	295	367
	Canadian Wheat Board Act.....			20,340	9,600		
	Royal Grain Inquiry Commission.....		96				
	Relief Act.....	43					
	War Expenditures.....					3,000	
V	SOLDIER SETTLEMENT OF CANADA—						
	Cost of Administration.....	739	708	587	556	546	755
	Payment to U.K. <i>re</i> losses.....	70	13	37	9	12	12
	Miscellaneous.....					8	
VI	DEPARTMENT OF EXTERNAL AFFAIRS—						
	Expenses of Wheat Advisory Commission.....		2	1	2		
	Imperial Agricultural Bureau.....		1				
	International Wheat Council.....					2	3
VII	DEPARTMENT OF LABOUR—						
	Unemployment and Agricultural Assistance.....	290	1,860	743	268	144	
	War Expenditures.....				54	372	519
	Sub-Total.....	2,984	4,982	24,293	13,601	20,557	30,365
	TOTAL.....	9,758	26,901	48,664	94,492	76,015	137,558

TABLE 6
PRINCE EDWARD ISLAND
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933	1937	1939	1941	1942	1943
		— Dec. 31 1933	— Dec. 31 1937	— Dec. 31 1939	— Dec. 31 1941	— Dec. 31 1942	— Dec. 31 1943
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	7	13	9	8	6	7
	B. Farms and Experimental Stations.....						
	C. Extension Service.....	11	10	14	15	18	13
	D. Agricultural Colleges and Schools.....		1	5	3	3	3
	E. Live Stock and Poultry.....	3	5	7	15 ¹	10	9
	F. Dairying.....	4	3	4	3	7 ²	6
	G. Horticulture.....		1	1			
	H. Grants to Societies, Farmers' Clubs.....	1	1	1	1	1	1
	I. Exhibitions.....	11	12	11	10	9	10
	J. Other Agriculture:						
	1. Limestone Bonus.....			18	10	14	28
	2. Bonus on Hay.....						7
	3. Field Crops.....	6	1	10	1	4	9
	4. Co-operatives.....			1	1	1	
	5. Miscellaneous.....			1	1	1	4
	TOTAL ³	40	45	79	63	70	92

¹ Includes hog bonus.

² Includes cheese bonus.

³ Miscellaneous receipts deducted.

3

2

3

5

4

5

TABLE 7
NOVA SCOTIA
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 Sept. 30 1933	1937 Nov. 30 1937	1939 Nov. 30 1939	1941 Nov. 30 1941	1942 Nov. 30 1942	1943 Nov. 30 1943
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	186	66	91	97	113	111
	B. Farms and Experimental Stations.....	8	7		1	4	1
	C. Extension Service.....	1	76	86	94	95	110
	D. Agricultural Colleges and Schools.....	20	23	49	34	33	29
	E. Live Stock and Poultry.....	6	20	16	22	26	24
	F. Dairying.....	2	1	1	3	2	6
	G. Horticulture.....	10	9	11	7	8	8
	H. Grants to Societies, Farmers' Clubs.....	30	19	22	29	24	29
	I. Exhibitions.....	10	9	9	5	6	5
	J. Other Agriculture—						
	1. Limestone Assistance.....	23	8	3	42	49	42
	2. Tree Removing Bonus.....					6	2
	3. Apple Maggot Control Board.....	12	10	7	5	4	5
	4. Land Breaking Assistance.....				11	46	25
	5. Seed Grain Assistance to Farmers.....					17	
	6. War Measures—						
	a. Limestone Assistance to Farmers.....			10			
	b. Purchase of Plows and Plowing with Tractors.....			6			
	c. Greater Production Campaign.....			1			
	7. Marketing Division.....		25	32	33	32	33
	8. Miscellaneous.....	32	2	4		2	14
	Sub-Total.....	340	275	348	383	467	444
II	DEPARTMENT OF EDUCATION—						
	Rural Education Extension.....	26	15	15	13	14	14
III	DEPARTMENT OF PROVINCIAL SECRETARY—						
	Credit Union Inspection 50%.....		2	2	2	3	3
IV	DEPARTMENT OF PROVINCIAL TREASURER—						
	Grants to Societies and Organizations.....		4	2	2	1	
	Paying Guarantee Farm Loan Account.....		1				
V	DEPARTMENT OF PUBLIC WORKS—						
	Agricultural College (Maintenance, Construction, Equipment).....	9	9	9	9	12	11
	Agricultural Bldg. (Capital).....			3		4	
	Sub-Total.....	35	31	31	26	34	28
	TOTAL.....	375	306	379	409	501	472

TABLE 8
NEW BRUNSWICK
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED
(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — Oct. 31 1933	1937 — Oct. 31 1937	1939 — Oct. 31 1939	1941 — Oct. 31 1941	1942 — Oct. 31 1942	1943 — Oct. 31 1943
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	11	16	18	18	18	20
	B. Farms and Experimental Stations.....						
	C. Extension Service.....	35	54	57	58	67	63
	D. Agricultural Colleges and Schools.....	2	3	11 ¹	4	4	5
	E. Live Stock and Poultry.....	21	53	67	68	78	104
	F. Dairying.....	8	20	21	24	26	34
	G. Horticulture.....	5	12	18	18	19	19
	H. Grants to Societies, Farmers' Clubs.....	19	20	20	20	20	20
	I. Exhibitions.....		9	9	1	2	2
	J. Other Agriculture—						
	1. Limestone Assistance.....	8	11	21	58	67	75
	2. Immigration.....	6	5	9	7	7	5
	3. Field Husbandry (soils and crops).....	6	6	9	10	11	10
	4. N.B. Dairy Products Commission.....		4	4	4	6	4
	5. Co-operatives 50%.....		1	3	4	5	5
	6. Land Clearing.....	50	2			2	2
	7. Drainage and Drain Tiles.....					6	4
	8. Miscellaneous.....	5	18	6	8	1	13
	Sub-Total.....	176	234	273	302	339	385
II	DEPARTMENT OF LANDS AND MINES—						
	Colonization.....	13	72	62	40	32	31
	Aid to Settlers.....	9					
	Sub-Total.....	22	72	62	40	32	31
	Cumulative Sub-Total.....	198	306	335	342	371	416
III	AGRICULTURAL RELIEF.....	31	3	17	2		
	TOTAL.....	229	309	352	344	371	416

¹ Includes Capital Expenditure for Youth Training under the Relief Act.

TABLE 9
QUEBEC
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — June 30 1934	1937 — June 30 1938	1939 — June 30 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	430	598	641	767	770	920
	B. Farms and Experimental Stations.....	101	137	101	120	86	100
	C. Extension Service.....	405	638	587	639	673	727
	D. Agricultural Colleges and Schools.....	368	552	552	563	543	609
	E. Live Stock and Poultry ¹	434	457	584	523	565	562
	F. Dairying.....	207	219	207	955 ²	1,315 ²	862 ²
	G. Horticulture.....	240	390	369	394	402	327
	H. Grants to Societies, Farmers' Clubs.....	127	134	155	137	157	168
	I. Exhibitions.....	48	113	69	66	52	64
	J. Other Agriculture						
	1. Limestone Subsidy.....	83	289	37	108	166	141
	2. Co-operatives.....	108	116	113	260	245	303
	3. Field Crops.....	172	117	214	275	358	221
	4. Credit Union (50%).....		10	15	20	29	32
	5. Rural Settlement.....				291	292	526
	6. Dairy Industry Commission of Quebec.....		43	51	44	40	55
	7. Drainage.....	341	437	304	676	603	463
	8. Sugar Beets.....				416	641	36
	9. Quebec Farm Credit Bureau.....		357	322	238	195	201
	10. Miscellaneous.....	239	422	268	183	79	95
	SUB-TOTAL ³	3,255	4,996	4,567	6,656	7,094	6,391
II	COLONIZATION.....	1,534	5,523	5,286	3,759	3,310	3,195
III	DEPARTMENT OF MUNICIPAL AFFAIRS TRADE AND COMMERCE—						
	Rural and Agricultural Training.....		98	21			
	Aid to Maple Sugar Industry.....			98	9	1	1
	Agricultural Census.....			2	2	3	2
	Grants to Exhibitions.....						3
IV	DEPARTMENT OF PROVINCIAL SECRETARY—						
	Agricultural Training.....				84	54	55
V	DEPARTMENT OF PUBLIC WORKS—						
	Agriculture.....				36	38	43
	Colonization.....				11	11	8
	SUB-TOTAL.....	1,534	5,621	5,407	3,901	3,417	3,307
	TOTAL.....	4,789	10,617	9,974	10,557	10,511	9,698

¹ Includes Hog Subsidy.

² Includes Cheese Subsidy.

³ Miscellaneous receipts deducted.

48 33 22 19 117 21

TABLE 10
ONTARIO
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED
(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — Oct. 31 1933	1937 — Mar. 31 1938	1939 — Mar. 31 1940	1941 — Mar. 31 1942	1942 — Mar. 31 1943	1943 — Mar. 31 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	40	55	57	60	60	62
	B. Farms and Experimental Stations.....	65	124	77	73	60	54
	C. Extension Service.....	375	381	402	385	391	401
	D. Agricultural Colleges and Schools.....	662	702	702	689	532	607
	E. Live Stock and Poultry.....	83	61	71	1,125 ¹	1,161 ¹	1,284 ¹
	F. Dairying.....	168	119	120	2,312 ²	2,666 ²	2,218 ²
	G. Horticulture.....	28	22	34	34	28	31
	H. Grants to Societies, Farmers' Clubs.....	116	126	140	137	129	116
	I. Exhibitions.....	146	120	82	67	68	69
	J. Other Agriculture:						
	1. Freight on Western Feed Grain.....				145		551
	2. Freight on Agricultural Lime.....	1	2	3	1	2	2
	3. Subsidy for Sugar Beets.....						37
	4. Milk Control Board.....		50	46	41	42	45
	5. Field Crops.....	16	30	25	30	24	28
	6. Co-operatives.....	45	22	22	24	20	15
	7. Northern Ontario Settlement.....	37	51	30	14	16	8
	8. Corn Borer Control.....	8	6	7	9	5	3
	9. Apple Maggot Control.....	3					
	10. Miscellaneous.....	46	35	29	27	127	192
	Sub-Total.....	1,839	1,906	1,847	5,173	5,331	5,723
II	DEPARTMENT OF EDUCATION—						
	Grants to School Boards, etc.....	170	235	249	54	48	71
	Grants for Agricultural Training.....	37	40	40	13	11	19
III	DEPARTMENT OF LABOUR—						
	Rural and Agricultural Training.....		9				
	Farm Labour Recruitment.....				56		
IV	DEPARTMENT OF LANDS AND FORESTS—						
	Back to the Land Movement.....	63					
V	DEPARTMENT OF PUBLIC WORKS—						
	Agricultural Bldgs. (repairs).....	4	16	32	3	6	6
	Agricultural Buildings.....	11	3	42	24	52	1
VI	DEPARTMENT OF PROVINCIAL TREASURER—						
	Agricultural Finance Act.....		1	1			
	Sub-Total.....	285	304	364	150	117	97
	TOTAL.....	2,124	2,210	2,211	5,323	5,448	5,820

¹ Includes Premiums on Swine and in 1943 also includes subsidy to farmers for clean wool.

² Includes subsidy on Cheddar Cheese.

TABLE 11
MANITOBA
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — April 30 1934	1937 — April 30 1938	1939 — April 30 1940	1941 — April 30 1942	1942 — April 30 1943	1943 — April 30 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	12	12	13	13	13	14
	B. Farms and Experimental Stations.....	4	1	1	1	1	.....
	C. Extension Service.....	67	68	110	130	117	116
	D. Agricultural Colleges and Schools.....	.....	14	5	.....	.....	.....
	E. Livestock and Poultry.....	17	31	44	32	37	41
	F. Dairying.....	14	14	18	16	18	20
	G. Horticulture.....	.....	.....	.....	.....	.....	.....
	H. Grants to Societies, Farmers' Clubs.....	18	29	36	23	21	22
	I. Exhibitions.....	.....	.....	.....	.....	.....	.....
	J. Other Agriculture						
	1. Debt Adjustment Board.....	26	21	21	17	15	15
	2. Grasshopper Control.....	57	1	6	4	2	.....
	3. Field Crops.....	12	10	14	19	20	21
	4. Co-operatives 50%.....	.....	.....	1	7	2	3
	5. Manitoba Electrification Comm.....	.....	.....	.....	.....	13	.....
	6. Miscellaneous.....	24	16	36	22	21	28
	Sub-Total.....	251	217	305	284	280	280
II	TREASURY—						
	Grant to Manitoba Farm Loan Assoc.....	8	3	.....	.....	.....	.....
	Sub-Total.....	8	3	.....	.....	.....	.....
	Cumulative Sub-Total.....	259	220	305	284	280	280
III	AGRICULTURAL RELIEF.....	69	347	174	3	17	7
	TOTAL.....	328	567	479	287	297	287

TABLE 12
SASKATCHEWAN
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED
(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — April 30 1934	1937 — April 30 1938	1939 — April 30 1940	1941 — April 30 1942	1942 — April 30 1943	1943 — April 30 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	53	22	32	25	25	23
	B. Farms and Experimental Stations.....	7	4	3	2	2	1
	C. Extension Service.....		18	69	86	76	54
	D. Agricultural Colleges and Schools.....			5 ¹	1 ¹	2 ¹	4 ¹
	E. Live Stock and Poultry.....	82	85	80	89	92	141 ²
	F. Dairying.....	37	48	48	35	36	37
	G. Horticulture.....						
	H. Grants to Societies, Farmers' Clubs.....	1	1	1	1	1	1
	I. Exhibitions.....	22	23	26	29	30	32
	J. Other Agriculture—						
	1. Land Utilization Act.....		4	16	19	19	19
	2. Field Crops.....	58	61	216	22	51	19
	3. Co-operatives 90%.....	6	12	17	19	19	21
	4. Debt Adjustment.....	70					
	5. Miscellaneous.....	15	10	5	18	27	32
	Sub-Total.....	351	288	518	346	380	384
II	DEPARTMENT OF NATURAL RESOURCES—						
	Grazing Office.....	11	9				
III	DEPARTMENT OF PUBLIC WORKS—						
	Farmers' Building, Regina.....	6					
	University of Saskatchewan (Field Husbandry Building).....		70				
	Saskatchewan Co-operative Creamery Building.....						9
IV	DEPARTMENT OF EDUCATION—						
	University of Saskatchewan (Agricultural Extension).....		35	35	35	35	35
V	DEPARTMENT OF ATTORNEY GENERAL—						
	Administration of the Debt Adjustment Act.....		71	72	61	57	
	Agricultural Land Debt, Ownership & Tenancy Survey.....						24
VI	DEPARTMENT OF MUNICIPAL AFFAIRS—						
	Transportation of Farm Labour.....					22	90
	Supervision of 1938 Seed Grain Advances.....						1
VII	TREASURY—						
	Grain Inquiry.....		1				
	Sub-Total.....	17	186	107	96	114	159
	Cumulative Sub-Total.....	368	474	625	442	494	543
VIII	AGRICULTURAL RELIEF.....	2,210	19,463	1,319	103	76	
	TOTAL.....	2,578	19,937	1,944	545	570	543

¹ Money expended on Vocational Training.² Includes wool bonus.

TABLE 13
ALBERTA
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED

(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — March 31 1934	1937 — March 31 1938	1939 — March 31 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I	AGRICULTURE—						
	A. Administration.....	37	36	36	35	35	38
	B. Farms and Experimental Stations.....	3	20	26	21	25	10
	C. Extension Service.....	56	70	89	80	87	90
	D. Agricultural Colleges and Schools.....	28	92	65	64	45	34
	E. Live Stock and Poultry.....	61	83	72	78	81	209 ¹
	F. Dairying.....	14	23	20	25	24	25
	G. Horticulture.....						
	H. Grants to Societies, Farmers' Clubs.....	7	11	12	10	10	9
	I. Exhibitions.....	6	6	3	2	2	1
	J. Other Agriculture—						
	1. Field Crops.....	25	52	56	54	92	107
	2. Agricultural Pests.....	90	116	118	2	6	5
	3. Miscellaneous.....	3	6	20	15	28	74
	SUB-TOTAL.....	330	515	517	386	435	602
II	DEPARTMENT OF TRADE AND COMMERCE—						
	Co-operative Activities Supervision Act 50%.....			2	3	5	7
III	EXECUTIVE COUNCIL—						
	Exhibit at World Grain Congress.....	4					
IV	DEPARTMENT OF PUBLIC WORKS—						
	Agricultural Schools (Maintenance, Construction)....	25	46	52	24	29	36
	Demonstration Farm, Brooks (Maintenance, Construction).....					11	4
V	DEPARTMENT OF ATTORNEY GENERAL—						
	Debt Adjustment Act.....	64	30				
VI	DEPARTMENT OF MUNICIPAL AFFAIRS—						
	Live Stock Encouragement Act.....	8					
	Debt Adjustment Act.....			51	51	46	46
VII	TREASURY—						
	Co-op. Credit and Supervision Acts 50%.....	3	3	3	3	3	3
	Milk Control (Milk Enquiry 1933, 1937).....	4	4	9	3	3	3
	Grant: Alberta Poultry Producers' Marketing Board.....						3
VIII	DEPARTMENT OF LANDS AND MINES—						
	Supervision of Grazing.....	7					
	Tree Nurseries.....		1	2	2	2	2
	Grant for Destruction of Agricultural Pests.....				8	7	30
	SUB-TOTAL.....	115	84	119	94	106	134
	CUMULATIVE SUB-TOTAL.....	445	599	636	480	541	736
IX	AGRICULTURAL RELIEF.....	594	121	120			1
	TOTAL.....	1,039	720	756	480	541	737

¹ Includes wool bonus.

TABLE 14
BRITISH COLUMBIA
NET PROVINCIAL EXPENDITURES IN AGRICULTURE
CURRENT AND CAPITAL ACCOUNTS COMBINED
(Thousands of Dollars)

Item No.	Actual date of fiscal year end	1933 — March 31 1934	1937 — March 31 1938	1939 — March 31 1940	1941 — March 31 1942	1942 — March 31 1943	1943 — March 31 1944
I	DEPARTMENT OF AGRICULTURE—						
	A. Administration.....	34	43	45	43	42	39
	B. Farms and Experimental Stations.....						
	C. Extension Service.....	51	32	35	41	45	46
	D. Agricultural Colleges and Schools.....						
	E. Live Stock and Poultry.....	41	61	60	66	62	68
	F. Dairying.....	25	24	25	25	24	25
	G. Horticulture.....	36	52	51	55	51	54
	H. Grants to Societies, and Farmers' Clubs.....	4	7	12	9	7	7
	I. Exhibitions.....	18	36	24	24	12	12
	J. Other Agriculture—						
	1. Lime Assistance.....		1	1	1	1	4
	2. Egg Transportation Subsidy.....				27	5	
	3. Rebates on Stumping Powder.....	11	14	14	8	6	11
	4. Markets Branch.....	6	6	4	6	5	4
	5. Field Crops.....	45	40	40	39	39	41
	6. Grasshopper Control.....	1	19	10	3	2	6
	7. Miscellaneous.....	2	2	4	3	3	44
	Sub-Total.....	274	337	325	350	304	361
II.	DEPARTMENT OF EDUCATION—						
	Fairbridge Farm School.....				12	12	12
III	DEPARTMENT OF LANDS—						
	Administration of Land Settlement.....	6			11	19	21
	Soldiers' Land Act.....	32	36	37	38	37	47
	Grazing Act.....	5	5	6	12	10	10
	Agriculture Act.....	49	34	41	259		
	Land Settlement and Development Act.....			6	2	1	
IV	DEPARTMENT OF ATTORNEY-GENERAL—						
	Credit Union Act 50%.....			1	1	2	2
	Sub-Total.....	92	75	91	335	81	92
	Cumulative Sub-Total.....	366	412	416	685	385	453
V	AGRICULTURAL RELIEF.....	7	18	18	1		
	TOTAL.....	373	430	434	686	385	453

TABLE 15
NET VALUE OF AGRICULTURAL PRODUCTION IN CANADA, 1929-1944

Year	Value	Year	Value
	\$000		\$000
1929.....	942,649	1937.....	712,044
1930.....	762,800	1938.....	736,355
1931.....	546,867	1939.....	826,390
1932.....	494,775	1940.....	897,700
1933.....	486,894	1941.....	951,856
1934.....	569,222	1942.....	1,552,563
1935.....	597,062	1943.....	1,419,861
1936.....	680,930	1944.....	1,790,676

TABLE 16
ANNUAL INDEX NUMBERS OF WHOLESALE PRICES OF FARM PRODUCTS,
LIVING COSTS AND PRICES OF COMMODITIES AND SERVICES
USED BY FARMERS
CANADA

Year	Index numbers of Wholesale Prices of Canadian Farm Products 1913-1944	Index Numbers of Farm Living Costs 1913-1944 ¹	Composite Price Index Numbers of Commodities and Services used by Farmers 1922-1944 ²
	(1935-39 = 100)	(1935-39 = 100)	(1935-39 = 100)
1913.....	89.5	79.6	.....
1914.....	98.0	82.0	.....
1915.....	108.8	86.3	.....
1916.....	125.4	93.6	.....
1917.....	179.5	111.6	.....
1918.....	185.2	131.4	.....
1919.....	204.9	143.0	.....
1920.....	224.3	170.7	.....
1921.....	144.8	139.5	.....
1922.....	122.9	127.5	133.2
1923.....	113.8	127.9	128.7
1924.....	123.0	125.1	132.6
1925.....	141.1	123.6	131.8
1926.....	139.7	120.9	129.3
1927.....	142.6	119.5	130.1
1928.....	140.6	118.3	128.2
1929.....	140.8	117.4	127.5
1930.....	114.9	113.7	116.3
1931.....	78.6	103.7	100.8
1932.....	67.6	97.7	93.4
1933.....	71.2	95.7	90.0
1934.....	82.4	97.8	96.0
1935.....	88.7	97.9	96.0
1936.....	96.9	98.3	98.0
1937.....	121.6	102.9	105.4
1938.....	102.8	102.0	101.5
1939.....	89.8	99.5	99.1
1940.....	93.7	108.6	105.7
1941.....	99.4	114.2	114.1
1942.....	115.2	119.7	128.0
1943.....	133.9	121.7	136.0
1944.....	143.9	122.8	138.8

¹ The weights of this index were revised in 1938 when annual living expenditures were obtained for 1,692 families operating farms in all provinces of the Dominion. Food and clothing were the principal budget items, and outlay for these comprised about 51 per cent of total living expenditure. Fuel and light accounted for almost 7 per cent, while 16 per cent went for household equipment and supplies. Health care required about 9 per cent of the total, and miscellaneous items 17 per cent.

² This is an 11 factor index and includes prices of commodities representing the following groups: farm implements, building materials, gasoline, oil and grease, feed, fertilizer, binder twine, seed and hardware, tax rates, interest rates and wage rates.

TABLE 17
CASH INCOME FROM THE SALE OF FARM PRODUCTS, BY PROVINCES—1931-44
(\$000)

Province	1931	1932	1933	1934	1935
Prince Edward Island.....	4,207	2,876	3,298	4,109	3,831
Nova Scotia.....	12,696	10,281	12,635	13,179	13,861
New Brunswick.....	9,040	6,616	6,949	8,777	8,851
Quebec.....	62,280	47,644	47,745	60,364	64,593
Ontario.....	163,395	123,311	129,374	145,551	155,089
Manitoba.....	31,325	28,619	32,294	43,345	36,128
Saskatchewan.....	70,631	77,645	76,621	93,471	108,103
Alberta.....	70,956	68,790	69,067	95,281	98,912
British Columbia.....	20,558	17,733	18,568	21,205	21,932
CANADA.....	445,088	383,515	396,551	485,282	511,300
	1936	1937	1938	1939	1940
Prince Edward Island.....	5,163	5,970	5,269	6,534	7,237
Nova Scotia.....	14,294	17,584	17,703	13,116	17,170
New Brunswick.....	10,463	11,832	10,837	12,117	15,523
Quebec.....	72,104	85,508	89,849	101,493	120,681
Ontario.....	184,805	215,988	219,021	217,925	233,415
Manitoba.....	47,234	74,897	65,062	64,751	64,978
Saskatchewan.....	125,843	84,292	93,409	158,062	150,854
Alberta.....	94,851	122,174	133,918	120,167	127,192
British Columbia.....	23,481	27,497	29,249	28,169	28,795
CANADA.....	578,238	645,742	664,317	722,334	765,845
	1941	1942	1943	1944	
Prince Edward Island.....	8,551	11,200	14,100	13,800	
Nova Scotia.....	20,063	21,600	24,900	26,600	
New Brunswick.....	19,448	25,200	30,800	32,200	
Quebec.....	144,879	174,300	199,200	216,900	
Ontario.....	286,487	355,900	383,700	410,600	
Manitoba.....	81,648	103,400	145,700	168,400	
Saskatchewan.....	161,955	195,800	327,500	503,300	
Alberta.....	154,408	168,900	220,700	314,100	
British Columbia.....	36,600	44,600	55,500	65,800	
CANADA.....	914,039	1,100,900	1,402,100	1,751,700	

TABLE 18

CASH INCOME FROM SALE OF FARM PRODUCTS, CANADA AND PROVINCES, PER FARM
AND PER CAPITA FARM POPULATION—1931-1944

Province	Cash Income per Farm	Cash Income per Capita Farm Population	Province	Cash Income per Farm	Cash Income per Capita Farm Population ¹
	\$	\$		\$	\$
Prince Edward Island—			Quebec—		
1931.....	327	77	1935.....	450	82
1932.....	225	53	1936.....	496	91
1933.....	259	61	1937.....	581	106
1934.....	324	76	1938.....	603	110
1935.....	304	72	1939.....	673	123
1936.....	411	97	1940.....	790	144
1937.....	478	113	1941.....	937	171
1938.....	424	101	1942.....	1,127	206
1939.....	529	126	1943.....	1,288	235
1940.....	588	141	1944.....	1,403	256
1941.....	699	167			
1942.....	915	219	Ontario—		
1943.....	1,153	276	1931.....	850	208
1944.....	1,128	270	1932.....	646	159
			1933.....	683	168
Nova Scotia—			1934.....	774	191
1931.....	322	73	1935.....	831	206
1932.....	265	60	1936.....	998	248
1933.....	331	75	1937.....	1,175	293
1934.....	351	80	1938.....	1,201	301
1935.....	376	86	1939.....	1,204	303
1936.....	395	90	1940.....	1,300	328
1937.....	495	113	1941.....	1,608	407
1938.....	507	116	1942.....	1,998	506
1939.....	383	88	1943.....	2,154	545
1940.....	511	117	1944.....	2,305	583
1941.....	609	140			
1942.....	655	150	Manitoba—		
1943.....	755	173	1931.....	578	123
1944.....	807	185	1932.....	521	112
			1933.....	581	126
New Brunswick—			1934.....	770	168
1931.....	266	51	1935.....	633	139
1932.....	196	37	1936.....	818	181
1933.....	207	40	1937.....	1,295	289
1934.....	263	50	1938.....	1,124	253
1935.....	267	51	1939.....	1,118	254
1936.....	317	61	1940.....	1,121	257
1937.....	361	70	1941.....	1,407	326
1938.....	333	64	1942.....	1,782	413
1939.....	375	73	1943.....	2,511	582
1940.....	484	94	1944.....	2,902	672
1941.....	610	119			
1942.....	790	154	Saskatchewan—		
1943.....	966	188	1931.....	518	126
1944.....	1,010	197	1932.....	564	138
			1933.....	552	135
Quebec—			1934.....	668	164
1931.....	458	84	1935.....	766	189
1932.....	346	63	1936.....	884	219
1933.....	342	62	1937.....	595	150
1934.....	426	78	1938.....	663	170

TABLE 18—Continued

CASH INCOME FROM SALE OF FARM PRODUCTS, CANADA AND PROVINCES, PER FARM
AND PER CAPITA FARM POPULATION—1931-1944—Continued

Province	Cash Income per Farm	Cash Income per Capita Farm Population ¹	Province	Cash Income per Farm	Cash Income per Capita Farm Population ¹
	\$	\$		\$	\$
Saskatchewan—			British Columbia—		
1939.....	1,128	294	1934.....	810	208
1940.....	1,082	287	1935.....	837	214
1941.....	1,168	315	1936.....	895	227
1942.....	1,412	380	1937.....	1,047	265
1943.....	2,361	636	1938.....	1,113	280
1944.....	3,629	978	1939.....	1,071	268
			1940.....	1,093	273
Alberta—			1941.....	1,388	345
1931.....	728	191	1942.....	1,691	420
1932.....	702	183	1943.....	2,105	523
1933.....	701	181	1944.....	2,495	620
1934.....	961	239			
1935.....	991	245	CANADA—		
1936.....	945	237	1931.....	611	138
1937.....	1,219	308	1932.....	526	119
1938.....	1,338	340	1933.....	544	123
1939.....	1,202	308	1934.....	665	151
1940.....	1,274	329	1935.....	700	160
1941.....	1,548	403	1936.....	791	181
1942.....	1,694	441	1937.....	883	203
1943.....	2,213	576	1938.....	908	209
1944.....	3,150	819	1939.....	987	227
			1940.....	1,046	242
British Columbia—			1941.....	1,247	289
1931.....	788	205	1942.....	1,502	348
1932.....	679	176	1943.....	1,914	443
1933.....	710	183	1944.....	2,391	554

¹ Including dependents.

TABLE 19

TOTAL IMPROVED FARM ACREAGE, CANADA AND PROVINCES
CENSUS YEARS 1911-1941
(acres)

Province	1911	1921	1931	1941
Prince Edward Island.....	769,140	767,319	765,772	737,400
Nova Scotia.....	1,257,449	992,467	844,632	812,403
New Brunswick.....	1,444,567	1,368,023	1,330,232	1,235,431
Quebec.....	8,162,087	9,064,650	8,994,158	9,810,682 ¹
Ontario.....	13,653,216	13,169,359	13,272,986	13,363,361
Manitoba.....	6,746,169	8,057,823	8,521,930	9,829,174
Saskatchewan.....	11,871,907	25,037,401	33,548,988	35,577,320
Alberta.....	4,351,698 ²	11,768,042 ²	17,748,518	20,125,220
British Columbia.....	477,590	544,464	704,956	893,085
CANADA.....	48,733,823	70,769,548	85,732,172	92,384,076

¹ Preliminary estimate, Quebec 1941.² Includes Improved Acreage of Indian Reserves.

TABLE 20
AVERAGE SIZE OF FARMS, CANADA AND PROVINCES
CENSUS YEARS 1911-1941
(acres)

Province	1911	1921	1931	1941
Prince Edward Island	85.2	88.8	92.6	95.6
Nova Scotia	100.2	99.6	109.1	115.7
New Brunswick	120.2	116.5	122.0	124.3
Quebec	104.3	125.4	127.3	124.0 ¹
Ontario	104.5	114.3	118.9	125.6
Manitoba	279.3	274.5	279.2	291.1
Saskatchewan	295.7	368.5	407.9	432.3
Alberta	286.7 ²	353.1 ²	400.1	433.9
British Columbia	149.8	130.2	135.8	152.8
CANADA	159.7	198.1	223.9	238.4

¹ Preliminary Estimate.

² Includes Improved Acreage of Indian Reserves.

TABLE 21
AVERAGE IMPROVED ACREAGE PER FARM, CANADA AND PROVINCES
CENSUS YEARS 1911-1941
(acres)

Province	1911	1921	1931	1941
Prince Edward Island	54.5	56.0	59.5	60.3
Nova Scotia	24.0	20.9	21.4	24.6
New Brunswick	38.3	37.3	39.1	38.7
Quebec	54.5	65.9	66.2	63.4 ¹
Ontario	64.4	66.5	69.1	75.0
Manitoba	154.6	151.3	157.2	169.4
Saskatchewan	125.0	209.6	245.8	256.5
Alberta	71.9 ²	141.9 ²	182.2	201.8
British Columbia	28.2	24.8	27.0	33.8
CANADA	71.4	99.5	117.7	126.1

¹ Preliminary estimate.

² Includes Improved Acreage of Indian Reserves.

TABLE 22

NUMBERS OF PERSONS GAINFULLY EMPLOYED IN AGRICULTURE
CANADA AND PROVINCES, CENSUS YEARS, 1911-1941

Province	1911	1921	1931	1941
Prince Edward Island.....	19,714	18,516	18,353	16,661
Nova Scotia.....	47,713	49,244	44,033	37,573
New Brunswick.....	45,741	46,982	46,340	41,782
Quebec.....	204,616	221,036	230,547	255,083
Ontario.....	307,037	295,071	305,287	270,267
Manitoba.....	69,936	86,904	93,429	92,279
Saskatchewan.....	133,008	174,477	204,472	187,416
Alberta.....	80,528	114,193	145,746	141,201
British Columbia.....	24,442	35,121	43,638	41,554
CANADA.....	932,735	1,041,544	1,131,845	1,083,816

TABLE 23

IMPROVED ACREAGE PER PERSON GAINFULLY EMPLOYED IN AGRICULTURE
CANADA AND PROVINCES, CENSUS YEARS, 1911-1941

(acres)

Province	1911	1921	1931	1941
Prince Edward Island.....	39.0	41.4	41.7	44.3
Nova Scotia.....	26.4	20.2	19.2	21.6
New Brunswick.....	31.6	29.1	28.7	29.6
Quebec.....	39.9	41.0	39.0	38.5
Ontario.....	44.5	44.6	43.5	49.4
Manitoba.....	96.5	92.7	91.2	106.5
Saskatchewan.....	89.3	143.5	164.1	189.8
Alberta.....	54.0	103.1	121.8	142.5
British Columbia.....	19.5	15.5	16.2	21.5
CANADA.....	52.2	67.9	75.7	85.2

